Orthopantomograph® OP200
Orthoceph® OC200

User Manual & Technical Specifications

INSTRUMENTARIUM

5139539-100 rev 1

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1 Introduction

1.1 GENERAL

Instrumentarium Dental Orthopantomograph® OP200 panoramic unit is a software controlled diagnostic panoramic dental x-ray equipment for producing high quality images of dentition, TM-joints and skull. Anatomical details will be displayed on the film magnified nominally by 30%.

The Orthopantomograph® OP200 can perform the following procedures:

- Standard panoramic exposure
- Pediatric panoramic exposure
- Wide arch panoramic exposure
- Ortho Zone enhanced panoramic exposure
- Orthogonal panoramic exposure
- TMJ, lateral projection or
- Ortho TMJ axial corrected lateral projection (optional)
- TMJ, lateral projection jaw closed and open
- TMJ, PA projection
- TMJ, lateral and PA projection
- Maxillary sinus

Your Orthopantomograph® OP200, model OP200 OT or OP200 CR, can be field upgraded at a later time to the Orthoceph® OC200 model. With this addition, high quality cephalometric exposures can also be made.

NOTE!

OP200 must be installed according to the OP200 installation & Adjustments manual by a qualified technician. Only trained personnel should be allowed to operate OP200.

In addition to the above mentioned procedures Orthoceph® OC200 can perform the following cephalometric procedures:

- Lateral view
- Postero-anterior and Antero-posterior views
- Oblique projections
- Townes, Waters, Caldwell, SMV, Carpus

Orthopantomograph® OP200 or Orthoceph® OC200 can also be field upgraded to the OP/OC200 OT model. OP200 with the Ortho Trans option can do the following linear tomographic procedures:

- Maxillary imaging in longitudinal and transversal views
- Mandible imaging in longitudinal and transversal views

Digital imaging is possible with OP200 D and OC200 D models or by using phosphor image plates with OP200 CR, OC200 CR, OP200 OT/ CR and OC200 OT/CR models.

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As the manufacturer we strongly recommend that you read this manual before taking the unit into use.

1.2 MARKINGS AND GRAPHICS SYMBOLS

The following markings are used in this manual:

NOTE!

Contains useful information for the reader about the unit and its use.

CAUTION!

Contains important instructions. If these instructions are not observed, malfunction of the unit or damage to the unit or other property may occur.

WARNING!

Contains warnings and instructions about the safety of the unit. If these warnings are not respected, serious risks and injury may be caused to the patient and operator.

The following symbols are used in the OP200.

Radiographic control

Protective earth (ground)

Type B equipment

Dangerous voltage

On (Power)

Off (Power)

Attention, consult accompanying documents

If the unit has CE-marking it is CE-marked according to the Medical Device Directive 93/42/EEC.

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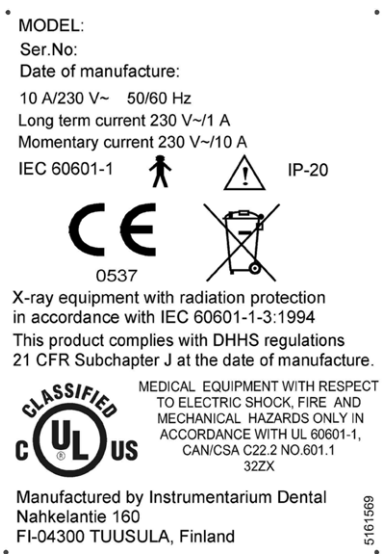
If the unit has UL-marking, it is UL-marked according to UL60601-1 and CAN/CSA C22.2 No.601.1

This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

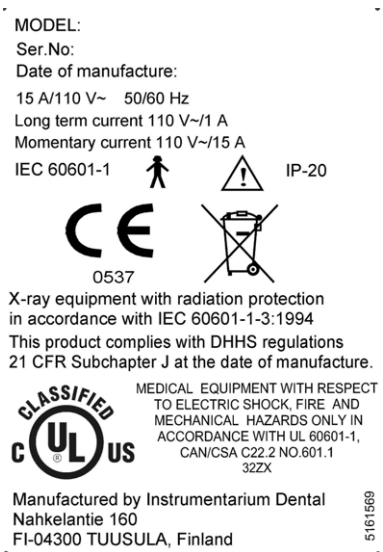
1.3 TYPE AND VERSION

The type and version of the OP200 are defined in the main label of the unit. The unit is class I, type B and with IP-20 protection.

Fig 1.1. Location of main label and CE mark


MODEL:
Ser.No:
Date of manufacture:
10 A/230 V~ 50/60 Hz
Long term current 230 V~/1 A
Momentary current 230 V~/10 A
IEC 60601-1
IP-20
0537
X-ray equipment with radiation protection in accordance with IEC 60601-1-3:1994
This product complies with DHHS regulations 21 CFR Subchapter J at the date of manufacture.
MEDICAL EQUIPMENT WITH RESPECT TO ELECTRIC SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL 60601-1, CAN/CSA C22.2 NO.601.1
32ZX
Manufactured by Instrumentarium Dental
Nahkelantie 160
FI-04300 TUUSULA, Finland
5161569

Main label (230 V)


MODEL:
Ser.No:
Date of manufacture:
15 A/110 V~ 50/60 Hz
Long term current 110 V~/1 A
Momentary current 110 V~/15 A
IEC 60601-1
IP-20
0537
X-ray equipment with radiation protection in accordance with IEC 60601-1-3:1994
This product complies with DHHS regulations 21 CFR Subchapter J at the date of manufacture.
MEDICAL EQUIPMENT WITH RESPECT TO ELECTRIC SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH UL 60601-1, CAN/CSA C22.2 NO.601.1
32ZX
Manufactured by Instrumentarium Dental
Nahkelantie 160
FI-04300 TUUSULA, Finland
5161569

Main label (110 V)

TYPE AND VERSION	
OP200	short form for Orthopantomograph® OP200
OC200	short form for Orthoceph® OC200
a	type of the x-ray tube insert which is originally utilized: 1 = Toshiba D-051S
b	version number: 1 OP200 models starting from s/n 100 000
S	indication of a "Special" version, marked only in products which have a non-standard modification

For example, OP200-1-1 is:
(OP200) Orthopantomograph® OP200
(-1) with Toshiba D-051S tube
(-1) first version of OP200.

1.4 OPTIONS, ACCESSORIES AND MANUALS

The options are listed in the appendices. The accessories are listed in sections 2.5 and 2.6. All standard items and approved accessories are suitable for use within the patient environment.

WARNING!

This product itself complies IEC601-1-1 medical safety standard but in order to the system incorporating also a PC to comply the standard, EITHER the PC has to be a medical PC OR the PC has to be located over 1,5 meters apart from the OP/OC200 unit. The installer and the user of the system shall confirm that at least one of the above requirements is fulfilled. A PC is a medical one if it complies IEC 601-1standard and that is indicated in the accompanying documents of the PC.

NOTE!

To maintain safe and correct functioning of OP200, only the approved accessories may be used.

CAUTION!

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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Following manuals and documents are shipped with the OP200:

- OP200 / OC200 User Manual & Technical Specifications
- OP200 / OC200 Installation & Adjustments Manual

These manuals and future updates are available on request from the manufacturer.

1.5 RADIATION PROTECTION GUIDELINES

X-ray equipment may cause injury if used improperly. The instructions contained in this manual must be read and followed when operating the Orthopantomograph® OP200. All government and local regulations pertaining to radiation safety must be observed.

NOTE!

For USA: Many provisions of these regulations are based on recommendations of the National Council on Radiation Protection and Measurements. Recommendations for dental x-ray protection are published in NCRP Report #35 available from NCRP Publications, 7910 Woodmont Avenue, Suite 1016, Bethesda, MD 20814.

Personal radiation monitoring and protective devices are available and recommended for staff members. It is also recommended to provide the patient with a protective apron. Consult the physician before taking images of pregnant patients.

WARNING!

Orthopantomograph® OP200 must not be used in rooms where an explosion hazard exists. Equipment not suitable for use in the presence of flammable mixtures.

OP200 with radiation protection in accordance with IEC601-1-3:1994.

1.5.1 Protection by distance

In all examinations the user of the x-ray equipment should wear protective clothing. The operator does not need to be close to the patient during normal use. The protection against stray radiation can be achieved by using the hand switch not less than 2 m (7 ft.) from the focal spot and the x-ray beam. Operator should maintain visible contact with the patient and technique factors. This allows immediate termination of radiation by the release of the exposure button in the event of a malfunction or disturbance.

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CAUTION X-RAYS
ATTENTION
RAYONS X
WARNING:
This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed

Fig 1.2. Caution information on Control panel

1.5.2 Laser lights

1 FH-light

2 Mid-Sagittal light

3 Layer light

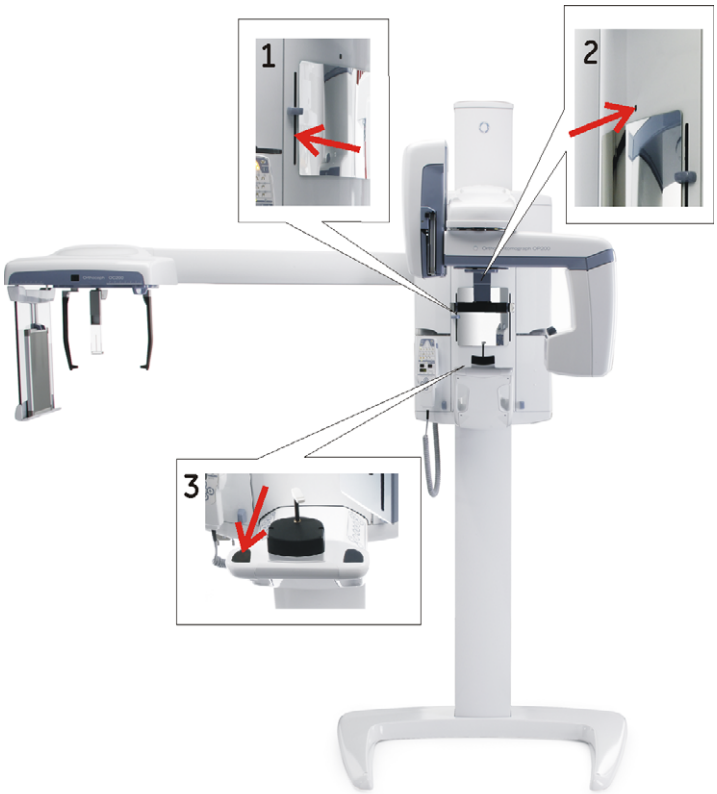

Fig 1.3. Laser light (CLASS 1 LASER PRODUCT). Max output 100µW.

1.5.3 Control from a protected area

The operator does not need to be close to the patient during normal use. Control panel hand switch or optional remote hand switch can be used from an area protected from the x-ray beam. The fully extended spiral cable length of the control panel hand switch is approx. 4 m / 13 ft. The cable length of the remote hand switch (part #69961) is approximately
10 m / 32 ft.

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1.5.4 Emergency Stop Switch

In case of malfunction of the exposure button release or other protective devices of the unit, an emergency stop switch is provided on the right side of the unit so that the patient can reach it. If the emergency stop switch is pressed during the exposure, the exposure is terminated immediately and the x-ray unit is completely stopped. The exposure interrupted by emergency stop switch, cannot be continued later, but has to be retaken from the beginning.

1.6 MANUFACTURER'S LIABILITY

As a manufacturer we can only assume liability of safe and reliable operation of this unit when

- OP200 unit installation was performed according to the OP200 Installation & Adjustments Manual and
- OP200 Unit is used according to the OP200 User Manual
- Maintenance and repairs are performed by a qualified Orthopantomograph® OP200 Dealer and
- Original or authorized spare parts are used

In order to quarantee maximal image quality for entire life time of this high performance imaging system, we suggest that a special image quality assurance procedure (* and test object designed for image quality assurance purposes is used (code 68795). Also we recommend qualified serviceman to check the unit to be in its original condition regarding electrical, radiation and mechanical safety according to our maintenance program described in more details in maintenance manual (code 61049) every year or after 2000 images. For more information please contact your local dealer.

*) According EN61223-3-4 and DIN 6868-151

If service on the unit is performed, a work order describing the type and extent of repair must be provided by the service technician. This

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must contain information of changes of nominal data or work range performed. The work order must furthermore indicate the date of repair, the name of the company concerned and a valid signature. User should keep this work order for future references.

1.7 DISPOSAL

Follow the local regulations on disposal of waste parts. OP200 has at least the following parts that should be regarded as non-environmental friendly waste products:

- X-ray source assembly
- All electronic circuits
- Column counter weight (Pb)

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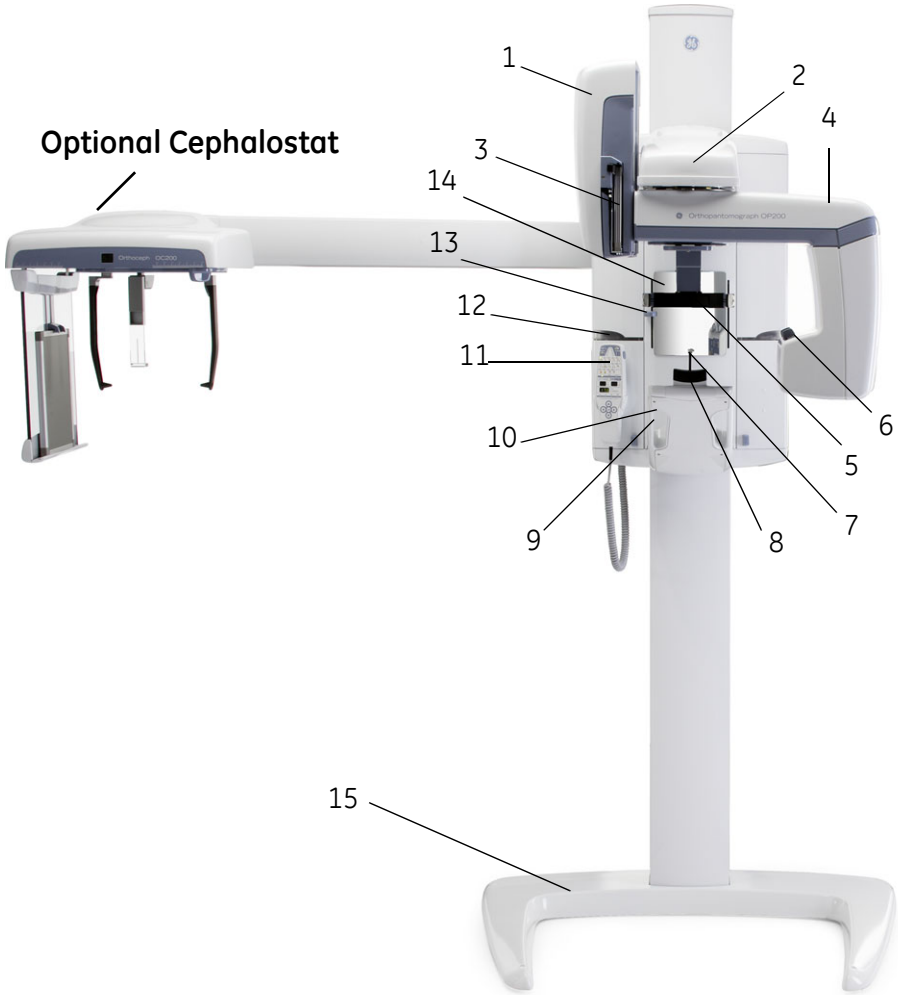
2 OP200 controls

2.1 MAIN PARTS



1 Cassette holder
2 Main support
3 Film cassette
4 Rotating unit
5 Head and Temple support
6 Primary collimator
7 Bite fork with rod
8 Chin rest
9 Handles
10 Patient positioning panel
11 Control panel
12 Exposure indicator lights
13 FH light height adjustment
14 Mirror
15 Base plate (optional)

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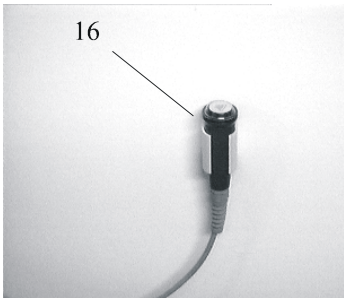
16 Exposure Button with cable and holder (optional in some markets)



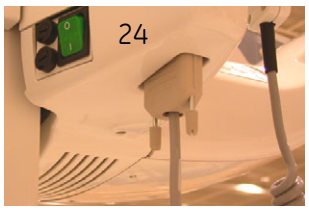
21) Main label

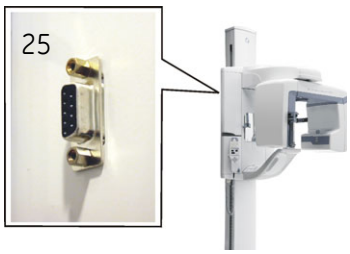
22) Power ON / OFF switch with an indicator

23) Main fuses with label

24) Connector for Control panel

25) Connector for Ortho ID (optional)





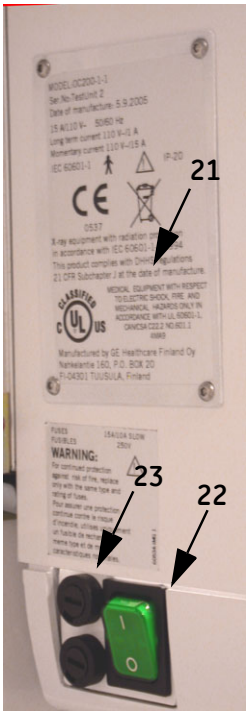


Fig 2.1. Unit main label and Power switch

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2.2 OC200 CEPH MAIN PARTS

Fig 2.2. OC200 LL: Cephalostat mounted on the left side

Cephalostat arm

1 Cephalostat head
2 Cassette holder
3 Cassette retainer
4 Film cassette sizes:
18 x 24 cm and
24 x 30 cm or
8” x 10” and
10” x 12”
5 Guides for optional grid
6 Lock for axial rotation
(see Fig 2.5)
7 Ear rods
8 Nasion support
9 Soft tissue scale display
10 Magnification scale
11 Ear holder brake

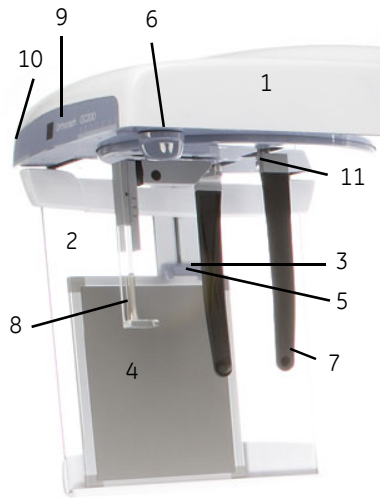

Fig 2.3. Head positioner, ear holde cassette holder

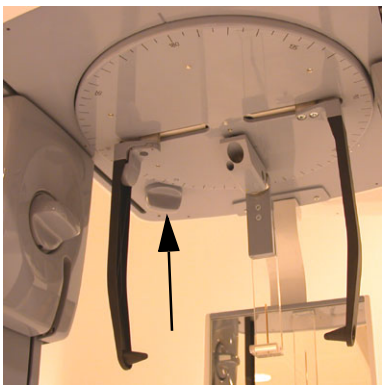

Fig 2.4. Lock for axial rotation

Fig 2.5. Soft tissue scale display

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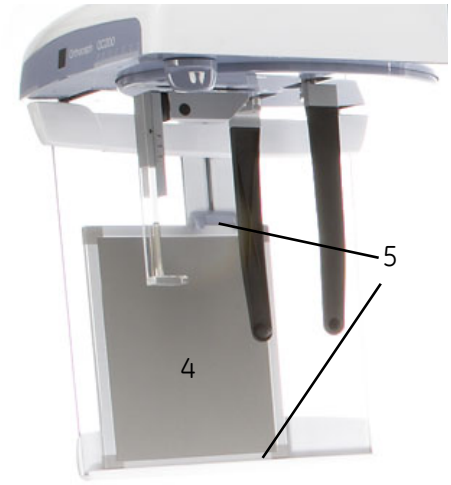

Fig 2.6. Cassette (4) and grooves (5) for optional grid

Fig 2.7. Panoramic cassette holder lifted to allow cephalostat procedure

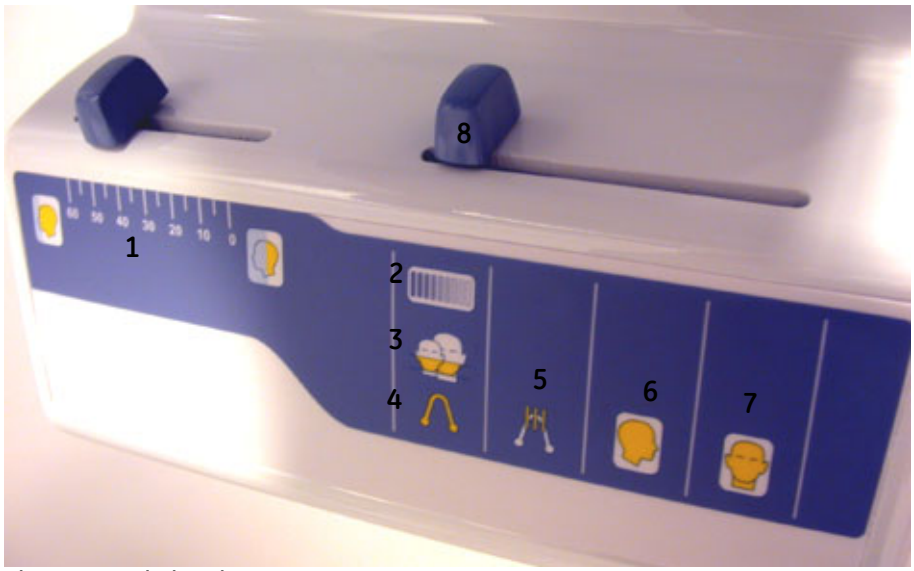

Fig 2.8. Tubehead

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Tube head

1 Soft tissue filter scale & slider

2 Quality Assurance collimator "QA"

3 Pediatric collimator

4 Panoramic collimator "PAN"

5 Ortho Trans Collimator

6 Cephalometric collimator alternatives: Lateral view: Europe 18 x 24 cm AH,
18 x 24 cm AV, other markets 8” x 10” AV, 10” x 8” AH, 10” x 12” AV

7 Cephalometric collimator: Symmetrical view: Europe 18 x 24 cm SV, other markets 8” x 10” SV

8 Collimator selection lever

NOTE!

5-7: Cassette orientation markings:
AV = Asymmetric vertical,
AH = Asymmetric horizontal,
SV = Symmetrical vertical (for facial / PA views).

NOTE!

Pediatric collimator is available when the lever on the PAN position is lifted up for one step. QA collimator is available when the lever on the PAN position is lifted up for two steps.

NOTE!

The collimator selection and film sizes are usually connected to the used systems in the counter so that you can select the cm or inch sizes, but not mixed.

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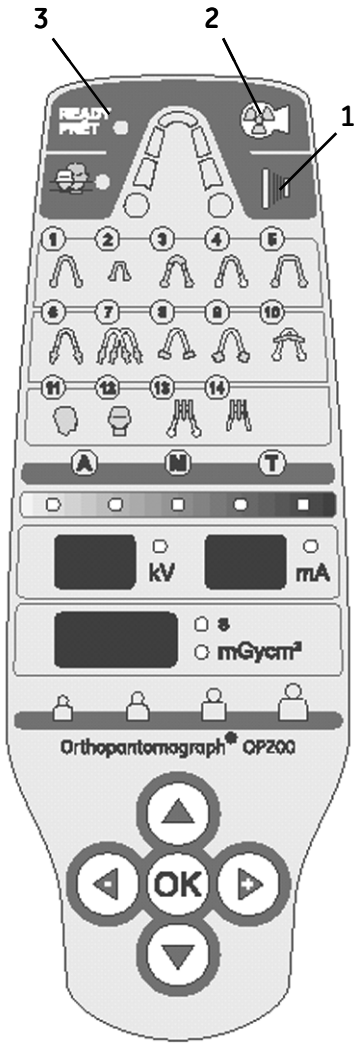
2.3 CONTROL PANEL



Exposure Control

1 Exposure Button

2 Exposure Indicator Light

3 "Ready" Indicator Light

1 2 3

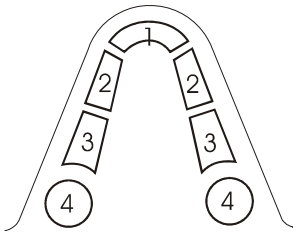
Sections

1 Anterior

2 Premolar

3 Molar

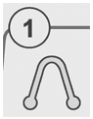
4 Jaw joint



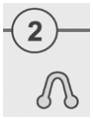
NOTE!

Sections 2 and 3 are combined as one section in panoramic programs.

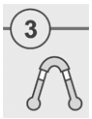
Imaging Procedures P1-P14 with Indicator lights



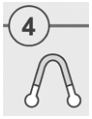
Standard Panoramic (P1)



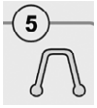
Pediatric Panoramic (P2)



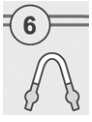
Ortho Zone enhanced panoramic exposure (P3)



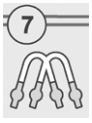
Orthogonal exposure (P4)



Wide arch panoramic exposure (P5)



TMJ, lateral projection (P6) or Ortho TMJ, axial corrected lateral projection (P6 optional)



Open-closed TMJ, lateral projection on one film (P7)

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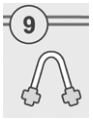
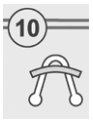
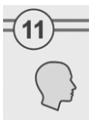
TMJ, posterior-anterior projection (P8)



TMJ lateral and TMJ PA projection on one film (P9)



Maxillary sinus view (P10)



Cephalo lateral projection (P11)

Cephalo PA projection and other special projections (P12)

Ortho Trans mandible (P13 optional)

Ortho Trans maxilla (P14 optional)

Exposure Modes with Indicator lights

Automatic Exposure Control

Test Mode

Manual Exposure Control

Automatic Exposure Density Scale (nine steps)

Default

One and half steps lighter

Half step darker

Two steps darker

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Control panel displays

kV display

mA display

Exposure time display / Exposure counter value display

Icons for Pre-programmed Technique Factors with Indicator lights

Child

Juvenile

Adult

Large adult

Function Selection buttons

Move the flashing indicator left or right
Decrease or increase the value on display

Move the flashing indicator up or down to the next selection row

P1-P12: Show Exposure counter value or reset user error (Ch)

In the programming mode:

- Enter & Exit Program Mode
- Accept the displayed choice

NOTE!

OK button *has special functions in the user and service programming mode. See User Program Chapter in the User Manual for details.*

Radiation warning

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2.4 POSITIONING PANELS

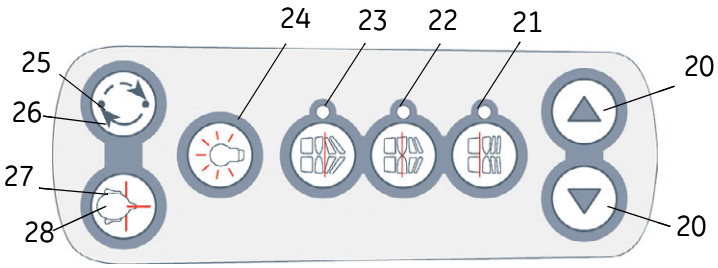

Fig 2.9. **Positioning panel, right side**
(on left side just the buttons 25 and 26 are flipped)

Positioning Panel button meaning in each mode				
Key	Panoramic (P1-P5)	Cephalostat (P11-P12)	TMJ (P6-P9)	Maxillary Sinus (P10)
20	Carriage vertical movement up / down			
21	moves the image layer 3 mm anterior during exposure		moves image layer anterior	moves the image layer 10 mm anterior from nominal position during exposure
22	normal occlusion / reset position		reset to middle	nominal position
23	moves the image layer 3 mm posterior during exposure		moves image layer posterior	moves the image layer 10 mm posterior from nominal position during exposure
24	Positioning lights on / off		Positioning lights on / off	
25	Rotating unit movement: Start position			
26	Cassette holder down			
27	Cassette holder up			
28	Rotating unit movement: Patient positioning			

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2.5 PATIENT POSITIONING ACCESSORIES

Fig 2.10. Panoramic patient positioning accessories

Fig 2.11. TMJ patient positioning accessories

Part code:	Part description:	Part code:	Part description:
62875	Chin rest	62904*	Nose support, long
62895	Sinus rest	62906*	Nose support, short
62942*	Bite block 10 pcs	60477	TMJ pointer
62985*	Bite fork, short 56 mm	64665	TMJ angle indicator (Ortho TMJ option)
62988*	Bite fork 71 mm	62943	TMJ chin rest (Ortho TMJ option)
62958*	Bite fork, long 80 mm, optional (not shown)	64694	TMJ pointer (for Ortho Trans units)
50076	Child adaptor		
6722	Chin support		
62965	Edentulous bite positioned, optional		

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NOTE!

*The parts marked with * are autoclavable.*

Convenient bins for small accessories and disposables are located on the both sides of the vertical carriage.

Fig 2.12. Left and right cabins.

2.6 OPTIONAL ACCESSORIES & DISPOSABLES

The following optional accessories, disposables and tools are available for the equipment:

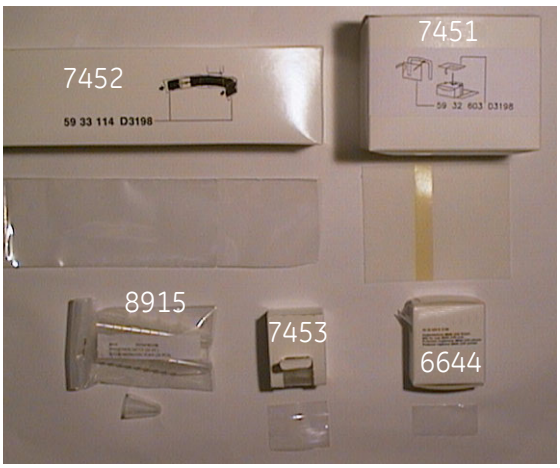

Fig 2.13. Consumer accessories

Part code:	Part description:
6644	Bite fork coat, 200 pcs
7451	Chin rest coat, 200 pcs

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Part code:	Part description:
7452	Temple support coat, 200 pcs
7453	Nose support coat, 200 pcs
8915	Ear holder coat, 20 pcs

2.7 CHANGING THE FUSES

Push inward on the fuse base and twist it counter-clockwise with a screwdriwer. The fuse with the base will come out.

Remove the fuse from the base and replace it with the new one. Repeat this with each blown fuse.

Fasten both fuses by pushing the base in and twisting it clockwise with a screwdriver.

Use only appropriate fuses:

326 Littelfuse 10A (slow blow) 230 VAC line voltage

MDA-15 Cooper Bussman 15A (time delay) 115 VAC line voltage

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3 Equipment preparations

3.1 CARE INSTRUCTIONS

X-ray devices are sophisticated electronic products including advanced technologies. As such, they have to be handled with a high degree of care. This document gives the care instructions applicable to the Orthopantomograph® panoramic and cephalostat units.

NOTE!

It is strictly mandatory to follow these Care Instructions in order to not void the warranty of the product.

CAUTION!

As a standard recommendation, clean the unit regularly using non-agressive, mild, commercially available cleaning agents.

3.2 CLEANING RECOMMENDATIONS

The unit should be cleaned after every usage between the patients. Items and surfaces that are not given special instructions for cleaning, disinfecting and sterilizing, can be cleaned with soft cloth moistured with disinfective after every usage.

WARNING!

Always disconnect OP200 from mains or switch off the power prior to cleaning or disinfecting the unit.

CAUTION!

Do not allow water or other cleaning liquids to enter the unit interior since these may cause short-circuits or corrosion.

3.2.1 Cleaning

The purpose of cleaning and rinsing is to remove all adherent visible soil (eg. blood, protein substances and other debris), to reduce the number of particulate and micro-organisms, and to reduce the amount of pyrogenic and antigenic material.

Use a cloth moistened in cool-to-lukewarm, soapy water to clean the unit, and prevent coagulation and thus faciliate the removal of protein substances. Then wipe with a cloth moistened in clear water. Mild detergent solution can be used. Use cleaners or solvents, which are listed as allowed cleaning agents below. If you are uncertain of the nature of cleaning agent, do not use it.

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Examples of cleaning agents that are allowed or prohibited when cleaning the unit panels:

Allowed: Methanol (metyl alcohol), Soap, Isopropyl alcohol, distilled water.

Not allowed: Bentzene, Chlorine bentzene, Acetone, Acetic ether, agents containing phenol, paracetic acid, peroxide and other oxygen-cleaving agents, sodium hypochlorite and iodine-cleaving agents.

3.2.2 Disinfection and sterilization

The disinfection and sterilization concerns the parts of the equipment like bite block, chin support and accessories. Wipe manually with clean cloth moistured in disinfectant solution. Never use corrosive or solvent disinfectants. All items and surfaces should be dried before next usage.

NOTE!

Wear gloves and other protective equipment during decontamination process.

WARNING!

Do not use any disinfecting sprays since the vapor could ignite causing injury.

Disinfecting techniques for both the unit and the room must comply with all laws and regulations that have jurisdiction of law within the jurisdiction on which the unit is.

3.2.2.1 Autoclave

Some removable parts in touch with the patient are sterilizable in autoclave. Such parts are:

Bite forks (62985, 62988, 62958), Bite block (62942) and Nose supports (62906, 62904).

If autoclaving is performed for these items, disinfection by immersing in disinfectant solution for 10 minutes is not needed.

3.2.2.2 Steam sterilization

Recommended parameters for sterilizable parts are:

Gravity-displacement steam sterilization
"Flash" sterilization:
Temperature: 270 F (132°C)
Exposure time: 3 minutes

Prevacuum steam sterilization
"Flash" sterilization:

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Temperature: 270 F (132°C)
Exposure time: 3 minutes

Steam-flush pressure-pulse steam sterilization
Temperature: 270 F to 275 F (132°C to 135°C)
Exposure time: 3 to 4 minutes

3.2.2.3 Ethylene oxide sterilization

Not recommended as sterilization process for OP200 parts.

3.2.3 Other sterilization processes

3.2.3.1 Dry heat sterilization

Dry heat sterilization can only be used with the bite forks.

Typical cycle parameters are:

Temperature: 338 F (170°C)

Exposure time: 60 minutes

Temperature: 375 F (190°C)

Exposure time: 6 minutes (unwrapped items) or 12 minutes (wrapped items) 3

3.2.3.2 Liquid chemical sterilant gases

Not recommended as sterilization process for OP200 parts.

3.2.3.3 Chemical sterilant gases

Not recommended as sterilization process for OP200 parts.

Testing

For example, a 2% hydrogen peroxide solution can be used to verify removal of protein from the unit. Soluton bubbles if it comes in contact with blood or protein substances. If any bubbling is observed, the decontamination process must be performed again.

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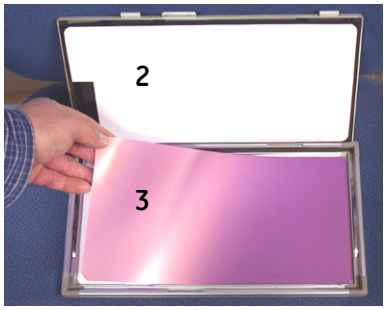
3.3 LOADING THE PANORAMIC CASSETTE

For Panoramic, TMJ and QA imaging procedures, the initial equipment preparation is as follows:

NOTE!

Panoramic x-ray film is extremely sensitive to light. It is important that this film is loaded in a dark room having no light leaks. No amount of white, blue, or green light is acceptable. If the darkroom is used, it must also be organized to have a clean, dry work area under proper safelight illumination to load the cassette.

1 Place the cassette on the work surface. By releasing the locking levers (1) open the cassette fully. The cassette may look different from the picture below, with two levers or hinges on top.



1 Locking levers
2 Intensifying screens
3 Film

2 Under safelight conditions, open the box of film. Holding the film (3) by the corners, place one piece into the cassette. Place it against the lower edge of the cassette. Do not slide the film over intensifying screens (2) as this will cause static electricity marks on the film.

3 Close the cassette by pressing the cover and chassis firmly together until they lock, with some cassettes use lever to lock it. Be sure the film box top is closed before switching the lights on or opening the darkroom door.

4 To unload the cassette for processing, reverse the above procedure.

5 Locate the power switch under the carriage backside. Turn the power switch to the "I" position.

6 Orient the panoramic film cassette with the arrow pointing up, flat side towards x-ray tube and slide it into the cassette holder. The green ready light will go on. Unit will rotate automatically for patient positioning. Remove the ceph cassette. The unit works only with one cassette on it's place.

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Fig 3.1. Ceph film cassette removal

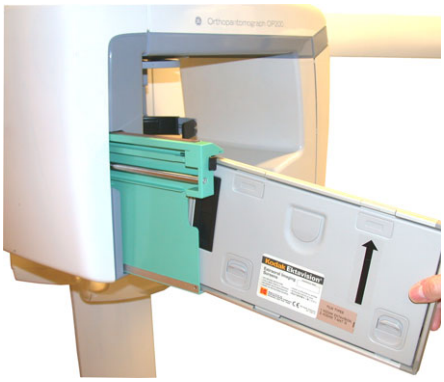

Fig 3.2. Panoramic film cassette orientation

NOTE!

The panoramic cassette will be on the correct position when it's pin is in the socket of the cassette holder.

7 Lift the cassette holder up to make the patient positioning easier. Cassette holder may have been programmed to raise automatically when the cassette is inserted. If not press patient positioning button. A built-in sensor prevents the exposure without the cassette in place. Move the head support as far ahead and up as possible.

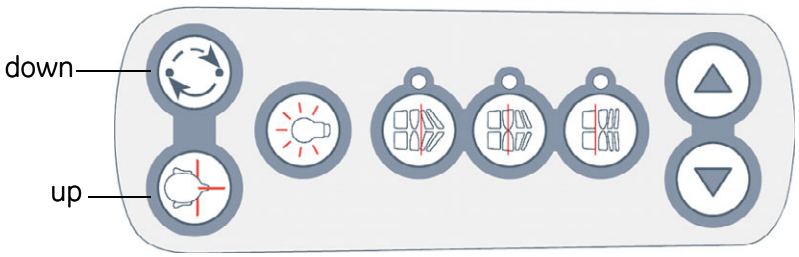

Fig 3.3. Cassette holder movements

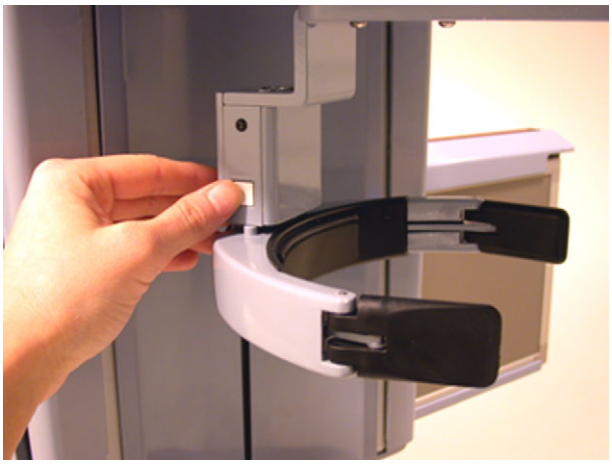

Fig 3.4. Moving the head support ahead

8 Select the panoramic collimation from the tube head. In OP200 set the lever to the right, in other models select the panoramic

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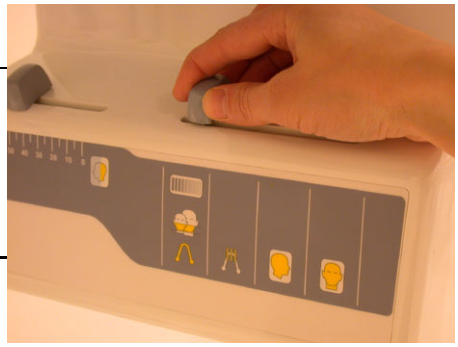
collimator "PAN". One of the panoramic programs will be selected automatically on the control panel.

NOTE!

In cephalostat units check that the soft tissue filter is in position **60***.*



9 Proceed to the section *Panoramic procedures* for Panoramic imaging and to the section *Special imaging procedures* for TMJ and Sinus Maxillary imaging.

3.4 CEPHALOSTAT CASSETTE LOADING

For all cephalometric imaging procedures, the initial equipment preparation is as follows:

1 Load the cassette per section *Loading the panoramic cassette* steps 1 to 3.

2 Locate the power switch under the carriage backside. Turn the power switch to the "I" position.

3 Remove the panoramic cassette. The unit works only with one cassette on it's place. There is no need to remove panoramic positioning accessories.

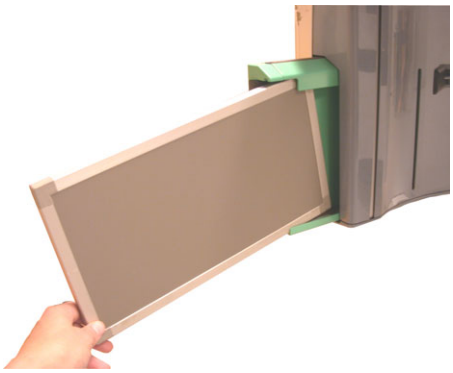
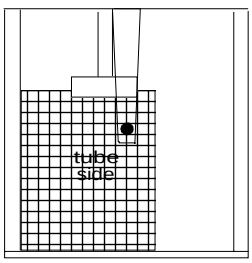


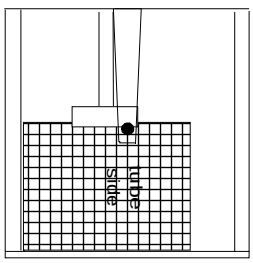
Fig 3.5. Panoramic film cassette

Fig 3.6. Ceph film cassette orientation

4 Orient the cephalostat film cassette with flat side towards x-ray tube and install it into the cassette holder. Lift the retainer, if needed.



Asymmetric vertical view



Asymmetric horizontal view

5 Cassette holder has markings to place cassette for different imaging procedures. Lower the cassette retainer. It will secure the cassette in place.

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6 Select one of the cephalometric collimator positions from the tube head. Technique factors and indicators change automatically to cephalometric values on the control panel.

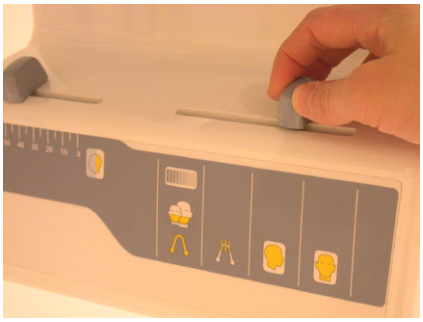

Fig 3.7. Cephalostat collimator selection

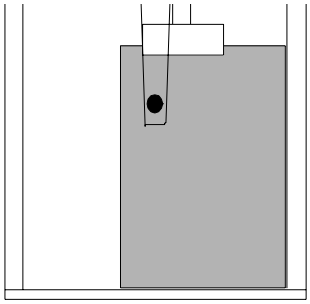

Fig 3.8. Asymmetric vertical view, cephalostat on the right

7 Press the Start button on the control panel. The tube head and cassette rack will automatically position for cephalometric exposures. The green ready light will go on.

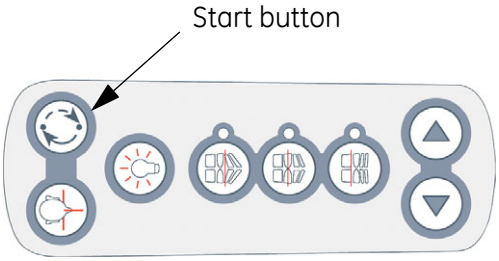

Fig 3.9. Align the tube head for ceph exposure

Fig 3.10. The cassette holder up position

NOTE!

Ready light will only light when
1) the cephalostat collimation has been selected,
2) the cephalostat cassette is in place and
3) the cassette holder has been raised.

8 Go to the section 6 Making the Cephalometric Exposures.

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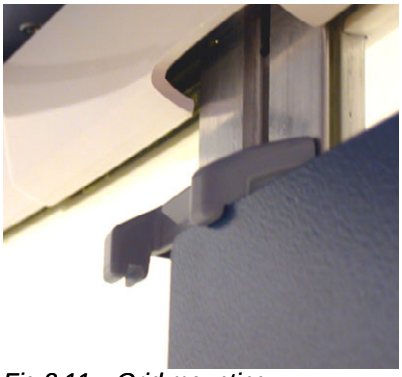
NOTE!

The OC200 is designed to accommodate an optional grid (G). Standard grids may be used. In front of the cassette (C) there are guides for grid mounting, built in to the cassette holder (H) and retainer (R).



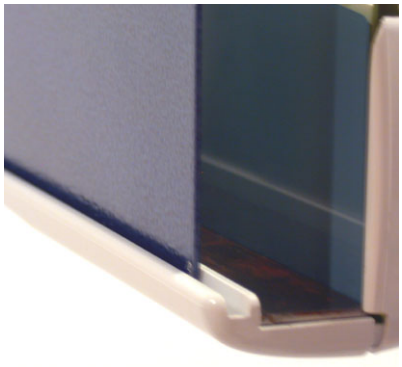


Fig 3.11. Grid mounting

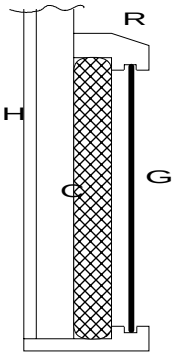


Fig 3.12. Optional grid (G)

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4 Panoramic procedures

4.1 P1: STANDARD PANORAMIC EXPOSURE

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Verify that the light under program 1 **(P1)** in the control panel is lit.

3 Press patient positioning button to rotate the rotating unit to the patient positioning position.

When the system is turned on it will automatically set itself to standard panoramic with AEC (automatic exposure control) settings. No other Control Panel settings are necessary.

NOTE!

If you wish to set the AEC density factors darker or lighter or wish to set the technique factors by patient size or manually, refer to section Imaging Technique.

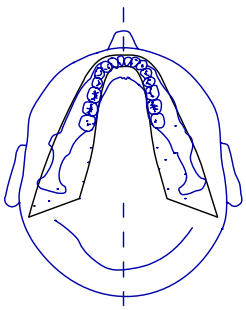

Fig 4.1. P1: Image Layer

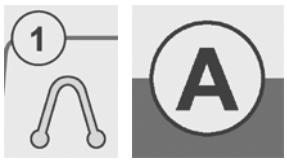

Fig 4.2. P1 & AEC

4 Install the chin rest and bite fork with bite fork rod (adult or child) with hygienic covers. Open temple supports.

Fig 4.3. Chin rest

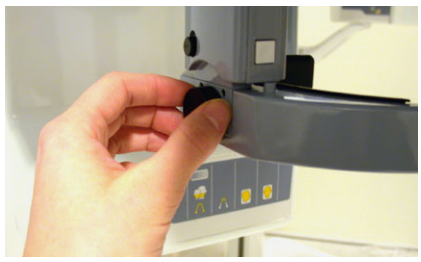

Fig 4.4. Open template supports

5 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc., from the head and neck area. Shadows caused by these opacities may obscure diagnosis.

6 It is strongly recommended to provide the patient with a lead apron for radiation protection.

7 Direct the patient to the unit and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles.

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By pressing the up or down button on the Patient positioning panel adjust the carriage height so the chin rest is at the patient's height. Have patient place chin on the chin rest.

8 Show the patient the grooves in the bite fork and place the bite fork into patient's mouth.

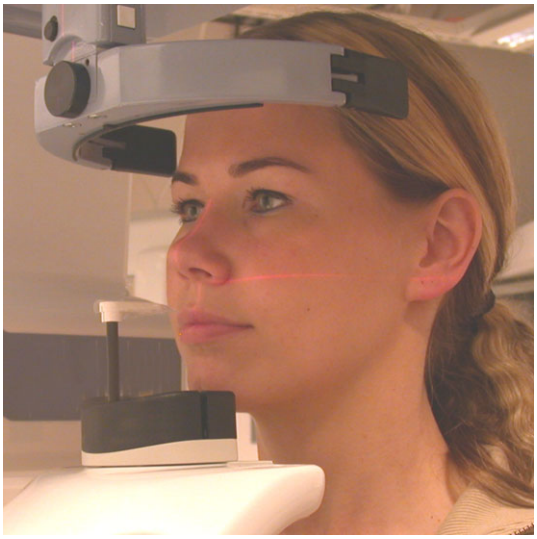


Fig 4.5. Standard patient positioning accessories installed

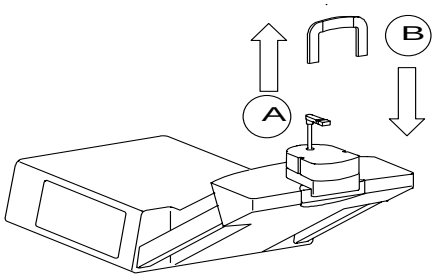
Fig 4.6. Hands on the grips and chin on the chin rest

NOTE!

The patient can either be standing, seated, or in a wheelchair.

If the bite fork cannot be used because the malocclusion or missing teeth, remove the bite fork with rod (**A**), reset the chin support (**B**), and use cotton rolls to separate the bite.

9 Positioning lights will switch on automatically when the carriage is moved. They stay on for 35 seconds or until exposure is initiated. If necessary, lights can also be switched on and off at the Positioning panel with light button.



10 Ask the patient to take a small step forward, to straighten the cervical vertebrae to minimize spinal shadow (See fig 4.8).

11 Patient's face and light lines can be seen in the curved mirror. Move the FH light to illuminate the patients' infra-orbital notch. By slightly raising or lowering the carriage, position the patient so that the Frankfort-Horizontal plane (FH) light passes over the ear opening and the infra-orbital notch. Be sure the patient does not slump if carriage is lowered.

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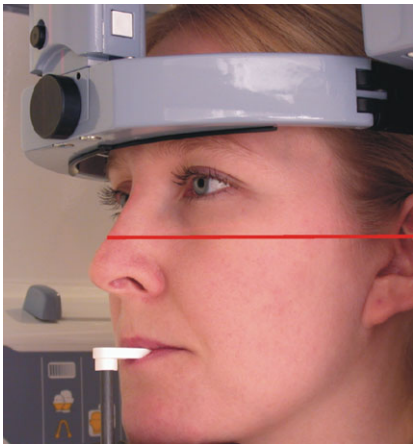

Fig 4.7. FH-light

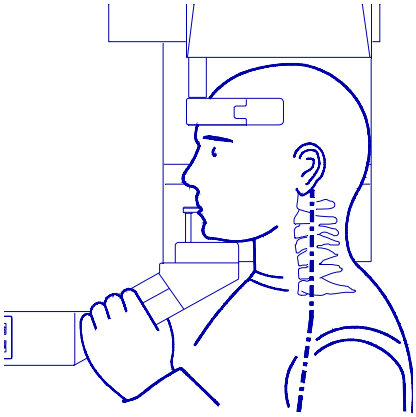

Fig 4.8. Straighten the cervical vertebrae by stepping forward

12 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane.

Fig 4.9. Front laser light

13 Move the head support by pressing the buttons on the sides against the patient and close the temple supports.

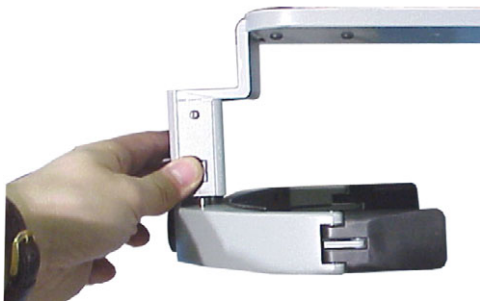

Fig 4.10. Moving the head support

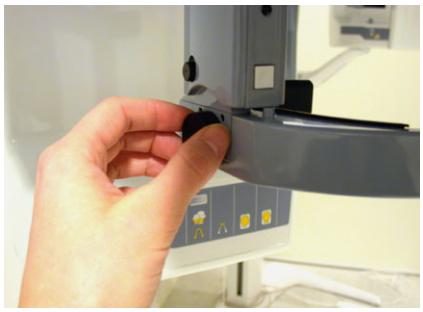

Fig 4.11. Closing the temple supports

14 Confirm the position of the focal trough in reference to the occlusion. The image layer light should illuminate the buccal of the maxillary canine (or base of the nose if edentulous).

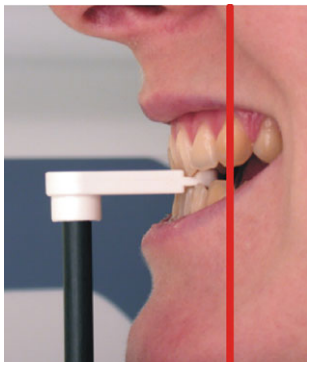

Fig 4.12. The image layer laser light

If not, then adjust the focal trough by pressing one of the occlusion correction buttons. Press the button closest to mirror, if the patient has progenia. Press the button closest to patient, if he has prognathism.

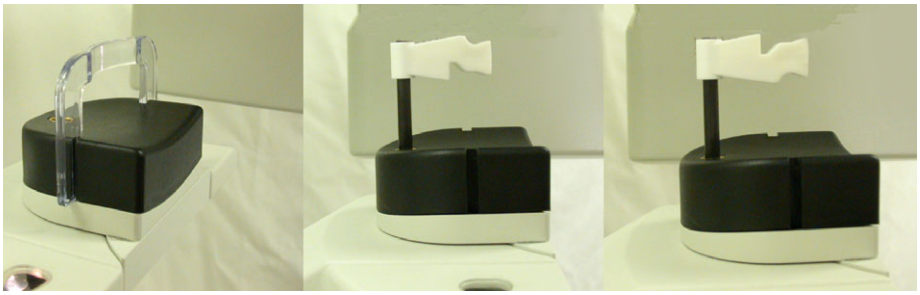

Fig 4.13. Accessories for toothless patients

Panel on the left: progenia-normal-prognatism
Panel on the right: prognatism-normal-progenia

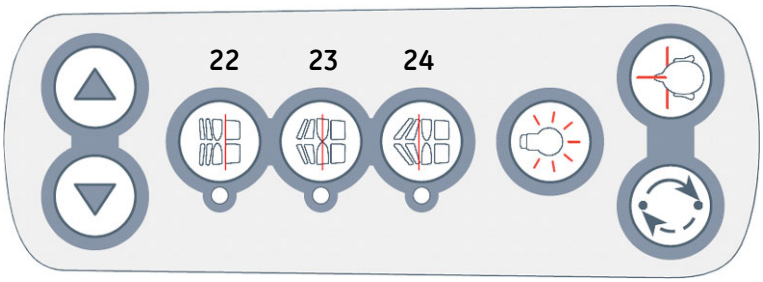

Fig 4.14. Positioning panel, located at left side.
Occlusion adjustment buttons: retrusion (22), normal (23), protrusion (24).

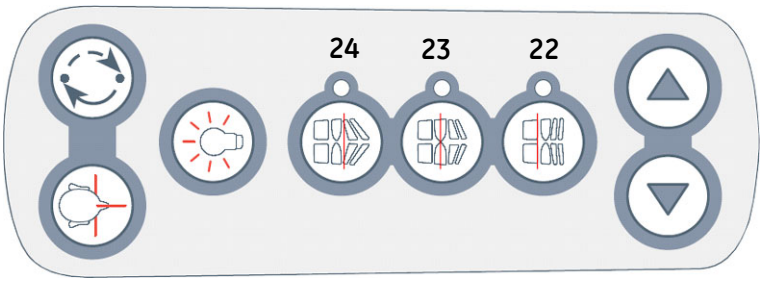

Fig 4.15. Positioning panel, located at right side.
Occlusion adjustment buttons: progenia (22), normal (23), prognatism (24)

This will adjust the unit during exposure. After the exposure, occlusion correction is automatically reset to center position.

15 Advise patient to close lips, swallow and raise tongue to the roof of the mouth. This enhances image quality. Ask the patient to

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breathe through the nose and remain still during the exposure. Patient can be asked to close eyes.

16 After patient positioning press start button, and wait until the unit stops. Check that the patient positioning is not changed when the rotating unit is moved to its starting position.

WARNING!

During the exposure cycle radiation control guidelines must be observed.

17 Use remote exposure button or take the exposure control panel to a position at least 2 meters (7 ft.) from the patient or behind a shield. After verifying that the "Ready" light is on, press and hold the exposure button. The exposure button must be pressed at least until the end of the exposure cycle as indicated by a light and audible tone, but it is recommended to keep pressing the exposure button until all movements stop. This will continue to move the rotating unit to better position for letting the patient out from the unit.

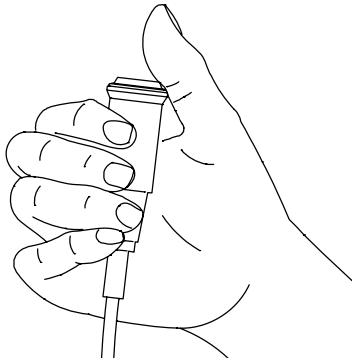

Fig 4.16. Remote exposure button

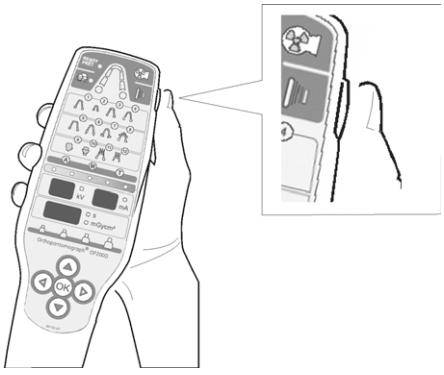

Fig 4.17. Control panel exposure button

NOTE!

In case of a problem, such as patient movement or if the image acquisition does not succeed, the exposure can be terminated immediately upon release of the exposure switch. Retake the exposure.

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NOTE!

If exposure cannot be initiated and an error code appears on the exposure control panel, refer to section Failure Diagnostics for explanation and correction.

18 At the end of the exposure, release temple supports and guide the patient away from the unit.

19 Remove disposable covers and disinfect the unit.

NOTE!

It is possible to choose any section of the toothed arc by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. One section must always be chosen. One to four out of five sections can be disabled. The AEC is not available with partial panoramic images!

4.2 P2: PEDIATRIC PANORAMIC EXPOSURE

Pediatric patients can be imaged with less radiation dosage and shorter exposure time. Patients with more narrow than average jaw can be exposed with this procedure, too.

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the pediatric exposure program on the Control Panel. Press the right button to move the flashing light from the standard panoramic position to the pediatric position **P2**.

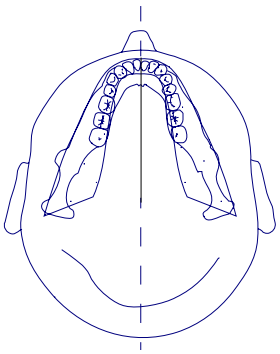

Fig 4.18. P2: Image layer

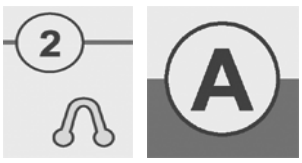

Fig 4.19. P2 & AEC mode

3 The system will remain in the Automatic Exposure Control mode. To set technique factors by patient size select one of the pre programmed patient size icons or manually, refer to section *Imaging Technique* for more information.

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Insert a child adapter to the head support when needed. Press adapter ends towards each other with fingers, slide the adapter against the head support, and release. Pins will hold the adapter in place.

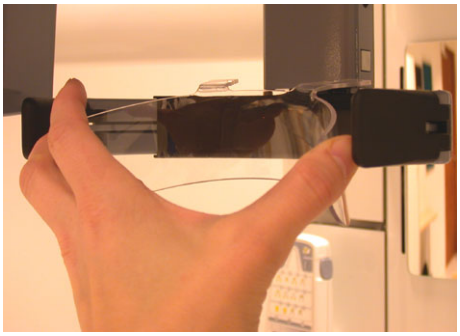


Fig 4.20. Child adapter

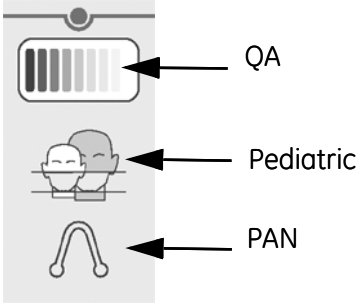
4 Position the patient and take exposure per steps 3 through 18 of the standard panoramic exposure procedure.

5 After the exposure return the system to the standard panoramic program by pressing the cursor buttons to move the flashing light to the standard program position.

NOTE!

The system can be operated without radiation to demonstrate the movement to the child by setting the system to the Test mode.

*To do this, press the down button to move the flashing light over the AEC mode (**A**).*
*Then press the right button twice to move the light over the Test mode (**T**). Pressing the exposure switch will now cause the system to cycle without radiation. To return to operational status, press the left button twice to move the flashing light over the AEC mode (**A**).*



NOTE!

The radiation dose can be reduced with small patients by using the collimator for beam restriction. Choose the pediatric collimator by selecting first the panoramic collimator and then pulling the lever up for one step.

NOTE!

It is possible to choose any section of the toothed arc by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. One section must always be chosen. One to four out of five sections can be disabled. The AEC is not available with partial panoramic images!

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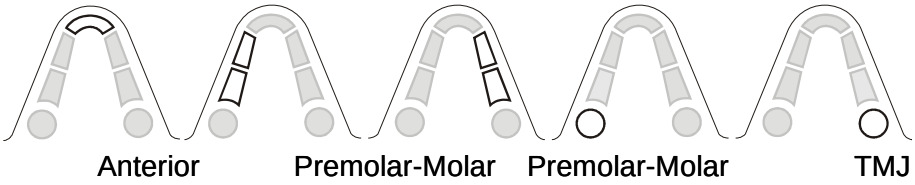

4.3 P3: ORTHO ZONE ENHANCED PANORAMIC EXPOSURE

The Ortho Zone program produces two different scanning geometries combined on the same image.

The first geometry (#1 and #3 in the figure) starts with the rotation center much further posterior than in the normal panoramic views (e.g. Programs P1 and P2).

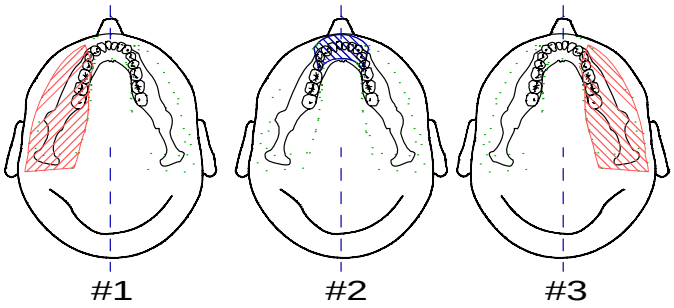

Fig 4.21. P3: Ortho Zone image layers

The result of this scanning location will allow for views of the TM joint without redundant shadows from the opposite side obscuring the image. Patients with prosthetic condyles or other posterior radio opaque objects can have the opposite side successfully imaged.

The second view (#2 in the figure) produces an image of the anterior region with a very wide layer of focus (approx. 35 mm). This view may be helpful when diagnosing trauma, wired shut, severe class III and uncooperative patients.

1 Prepare the equipment per section *Loading the panoramic cassette.*

2 Select the Ortho Zone program on the Exposure Control Panel. Press the right button twice to move the flashing light from the standard panoramic position to the Ortho Zone position **P3.**

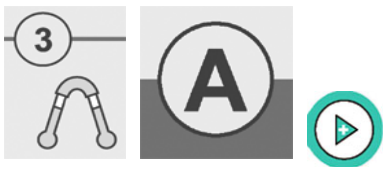

Fig 4.22. P3 & AEC mode

3 The system will remain in the Automatic Exposure Control mode. If you wish to set technique factors by patient size or manually, refer to section *Imaging technique*.

4 Position the patient per steps 3 through 14 of the standard panoramic exposure procedure.

5 Take the exposure per steps 15 through 18 of the standard panoramic exposure procedure.

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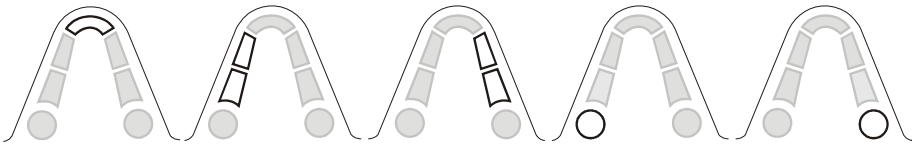
6 After the exposure return the system to the standard panoramic program by pressing the cursor buttons to move the flashing light to the standard program position.

NOTE!

It is possible to choose any section of the toothed arc by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. One section must always be chosen. One to four out of five sections can be disabled. The AEC is not available with partial panoramic images!



4.4 P4: ORTHOGONAL EXPOSURE

An optimized view of the dentition only with optimized anqulation and reduced radiation can be achieved by selecting the orthogonal exposure program.

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the orthogonal exposure program on the Exposure Control Panel. Press the right button three times to move the flashing light from the standard panoramic position **P1** to the orthogonal position **P4**.

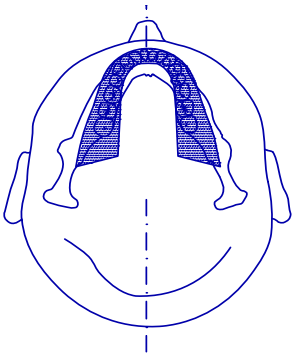


Fig 4.23. P4: Orthogonal image layer

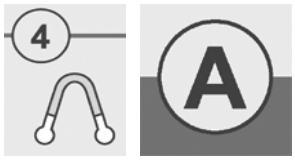


Fig 4.24. P4 & AEC

3 The system is in the Automatic Exposure Control mode. To set technique factors by patient size or manually select one of the pre programmed patient size icons. Refer to section *Imaging Technique* for more information.

4 Position the patient and take exposure per steps 3 through 18 of the standard panoramic exposure procedure.

5 After the exposure return the system to the standard panoramic program by pressing the cursor buttons to move the flashing light to the standard program position.

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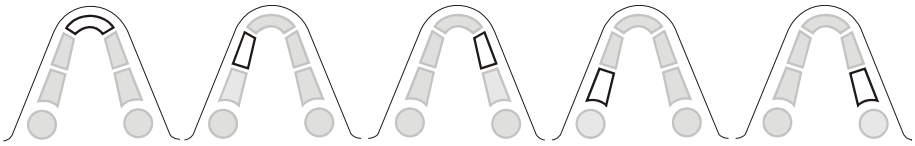
NOTE!

It is possible to choose any section of the toothed arc by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. One section must always be chosen. One to four out of five sections can be disabled. The AEC is not available with partial panoramic images!



4.5 P5: WIDE ARCH PANORAMIC EXPOSURE

When the patient has a wider than normal dental arch, an improved image can be achieved by selecting the wide layer exposure program.

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the wide layer panoramic program on the Exposure Control Panel. Press the right button twice to move the flashing light from the standard panoramic position **P1** to the wide layer position **P3**.

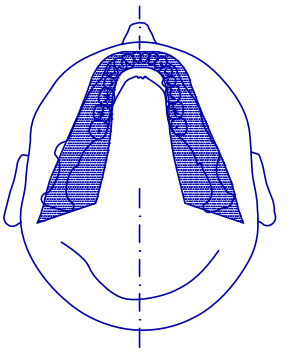


Fig 4.25. P3: Image layer

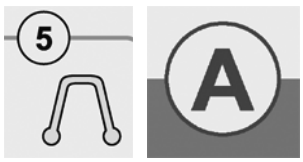


Fig 4.26. P3 & AEC mode

3 The system is in the Automatic Exposure Control mode. To set technique factors by patient size select one of the pre programmed patient size icons or manually, refer to section *Imaging Technique* for more information.

4 Position the patient and take exposure per steps 3 through 18 of the standard panoramic exposure procedure.

5 After the exposure return the system to the standard panoramic program by pressing the cursor buttons to move the flashing light to the standard program position.

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NOTE!

It is possible to choose any section of the toothed arc by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. One section must always be chosen. One to four out of five sections can be disabled. The AEC is not available with partial panoramic images!

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5 Special imaging procedures

5.1 P6: TMJ, LATERAL PROJECTION

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the imaging program P6 for TMJ, lateral projection on the Exposure Control Panel.

3 The system is in the Manual Exposure Control mode. In order to set technique factors up by patient size or manually, refer to section *Imaging Technique* for more information:

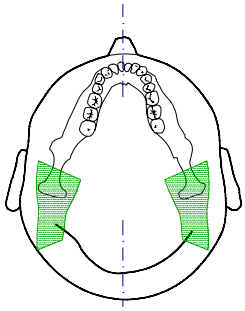

Fig 5.1. P6: Image layer

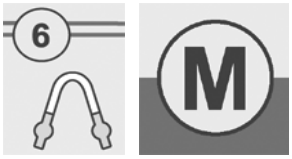

Fig 5.2. P6 & Manual mode

Technique factors in TMJ Imaging				
	Child	**Juvenile**	**Adult**	**Large adult**
110 VAC	66 kV/ 8 mA	66 kV/ 13 mA	66 kV/ 16 mA	73 kV/ 13 mA
230 VAC	66 kV/ 8 mA	66 kV/ 13 mA	66 kV/ 16 mA	70 kV/ 16 mA
Note: Example with Pr 52 PCO = 66/0, GCO = 6,0.				

4 Remove the bite fork, bite fork rod, chin rest and sinus rest. Install the TMJ nose support (2 models available) with hygienic coat and the TMJ pointer.

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Fig 5.3. TMJ pointer

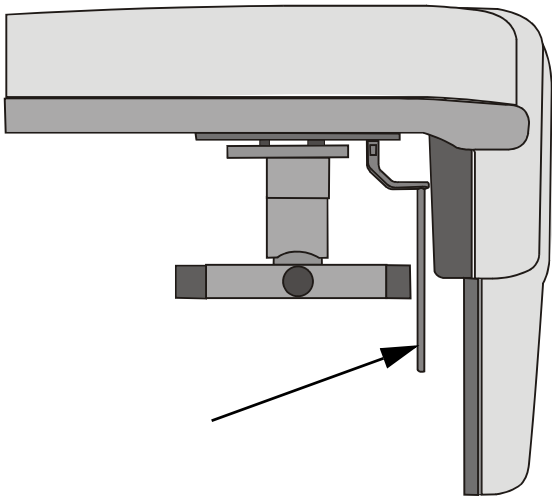

Fig 5.4. TMJ pointer in correct position

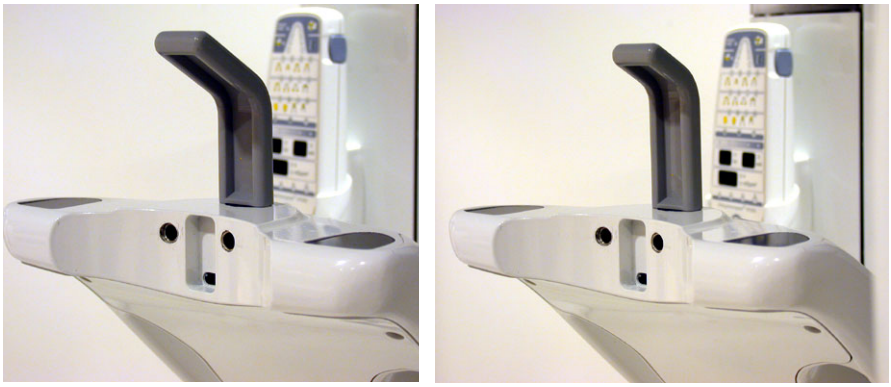

Fig 5.5. TMJ nose support, long and short

5 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc., from the head and neck area. Shadows caused by these opacities may obscure diagnosis.

6 It is strongly recommended to provide the patient with a lead apron for radiation protection.

7 Direct the patient to the machine and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles.

By pressing the up or down button on the Positioning Control panel adjust the carriage height so the TMJ nose support is at the patient's height. Have patient place nose against TMJ nose support.

8 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane. Move the head support by pressing it from sides against the patient and close the temple supports.

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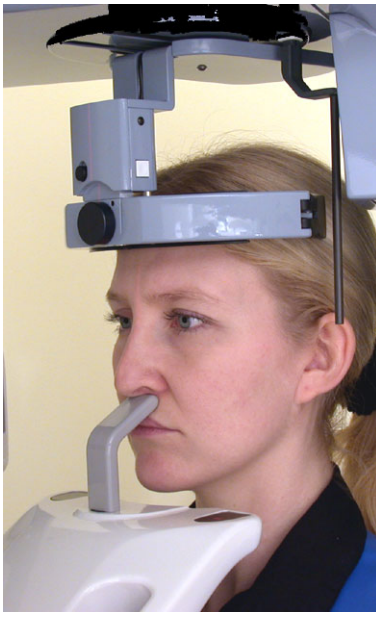

Fig 5.6. TMJ lateral projection

9 To adjust the focal trough reference to the TMJ, a special pointer is used. By pressing the appropriate occlusal adjustment button on the Positioning Panel, move the TMJ pointer forward (towards the mirror) or back until the pointer aligns with the external auditory meatus.

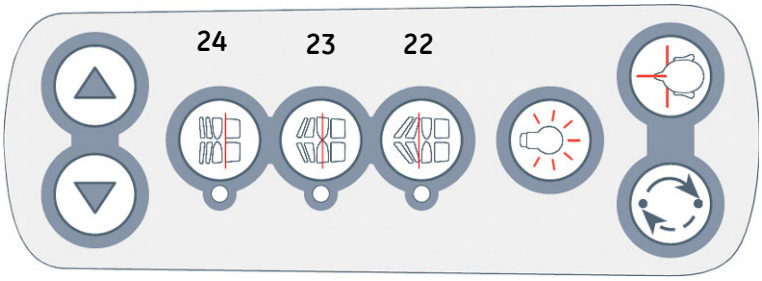

Fig 5.7. Positioning panel, left side. TMJ pointer adjustment buttons: backward (22), reset (23), forward (24)

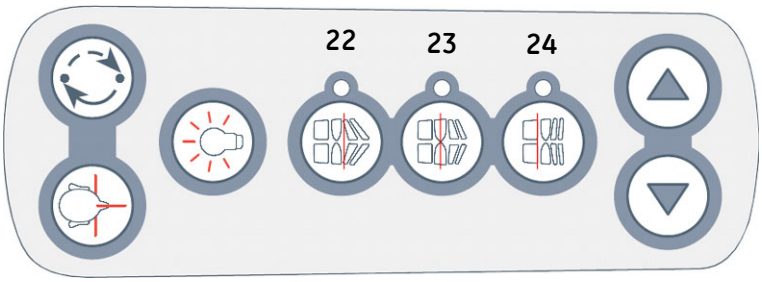

Fig 5.8. Positioning panel, right side. TMJ pointer adjustment buttons: backward (22), reset (23), forward (24)

10 If the TMJ pointer does not align with external auditory meatus, replace the TMJ nose support with the other model and repeat patient positioning.

11 Have the patient close or open the jaw.

12 Press and hold the exposure button. The system will cycle, exposing only the two TMJ's.

13 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer and TMJ nose support.

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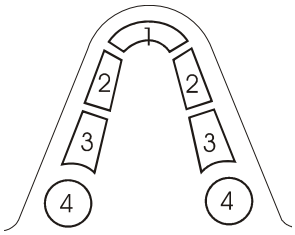
14 If the Ortho ID is available, mark the film with the patient's name, Id number, correction angles and notes. Process the film.

15 After the exposure return the system to the standard panoramic program by pressing the cursor buttons to move the flashing light to the standard program position.

NOTE!

It is possible to choose either side TMJ by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. Either section of jaw joints (number 4) is possible to disable in P6. Though one section must always be chosen.



5.2 P6: ORTHO TMJ, AXIAL CORRECTED LATERAL PROJECTION (OPTIONAL)

When used, this optional program replaces the TMJ lateral projection exposure program P6 on the Control panel.

Ortho TMJ program provides a wide layer axial corrected views for the patient's left and right temporomandibular joints. The angle of correction for any particular patient can be derived from tracing a submental vertex image (SMV) obtained with cephalostat, or a statistical average of 18° to 20° may be used if a SMV is unavailable.

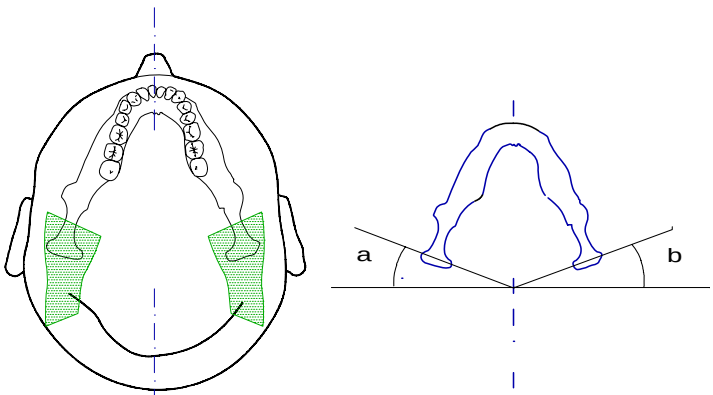


Fig 5.9. Condylar lateral angles

Fig 5.10. Image layer

1 Expose, process and trace a submental vertex image. Determine the angle of the long axis of the condyle in relationship to a lateral base line. This will be the correction angle. Take care in positioning the patient while taking the SMV. Be sure the patient's ala-tragus line is vertical, if not this can result in an incorrect angular measurement.

If the left and right condyles are at vaste different angles, two corrected joint views may be required.

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2 Prepare the equipment per section *Loading the panoramic cassette*.

3 Select the imaging program P6 for corrected lateral TMJ projections on the Exposure Control Panel.

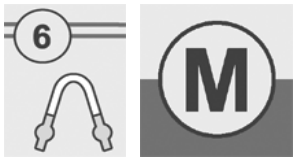

Fig 5.11. P6 & Manual mode

4 The system is in the Manual Exposure Control mode. To set technique factors by patient size select one of the pre programmed patient size icons or manually entering the suggested values from the table below. Technique factors are two steps higher compared to the standard TMJ lateral view program. Refer to section *Imaging Technique* for more information.

Technique factors in Ortho TMJ imaging

	Child	Juvenile	Adult	Large adult
110 VAC	66 kV/ 10 mA	66 kV/ 13 mA	66 kV/ 16 mA	73 kV/ 13 mA
230 VAC	66 kV/ 8 mA	66 kV/ 13 mA	66 kV/ 16 mA	70 kV/ 16 mA
Note: Example with Pr 52 PCO = 66/0, GCO = 6,0.				

5 Remove the bite fork, bite fork rod, chin rest and sinus rest. Install the TMJ chin rest with hygienic coat.

6 Install the carbon fiber TMJ pointer with the TMJ angle indicator into the socket over the patient's head.

Fig 5.12. Ortho TMJ patient positionin accessories installed

Fig 5.13. Ortho TMJ patient positionin accessories

7 Ask patient to remove any metal objects, such as eye glasses, jewelry, oral appliances, removable dentures, hearing aids, bib chain, etc. from the head and neck area. Shadows caused by these opacities may obscure diagnosis.

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8 It is strongly recommended to provide the patient with a lead apron for radiation protection.

9 Direct the patient to the machine and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles. By pressing the up or down button on the Positioning Control panel adjust the carriage height so that the TMJ chin rest is at the patient's chin level. Have patient place chin against the TMJ chin rest.

Fig 5.14. Ortho TMJ, patient positioning

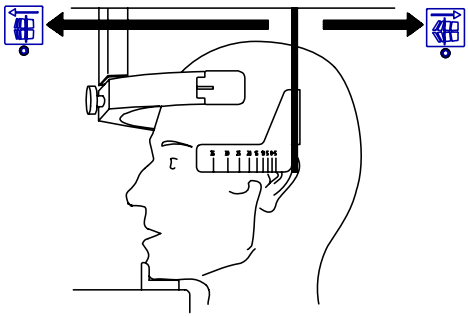

Fig 5.15. Angle indicator adjustment

10 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane. Move the head support by pressing it from sides against the patient and close the temple supports.

11 To adjust the x-ray beam angle to the patient's condylar angle the TMJ pointer and angle indicator are used. By pressing the appropriate occlusal button on the Patient positioning panel, move the TMJ angle indicator forward or back until the desired angle is displayed over the patient's condyle.

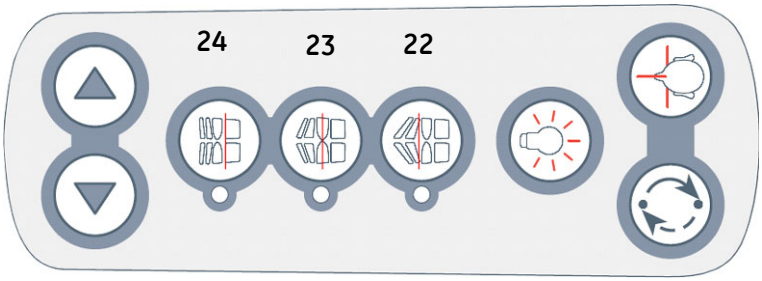

Fig 5.16. Positioning panel, left side. TMJ pointer adjustment buttons: backward (22), reset (23), forward (24)

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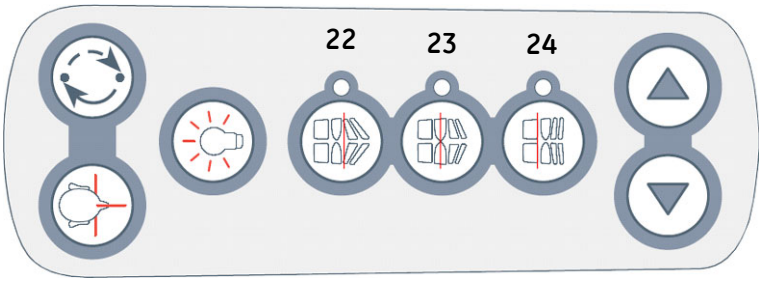


Fig 5.17. Positioning panel, right side. TMJ pointer adjustment buttons: backward (22), reset (23), forward (24)

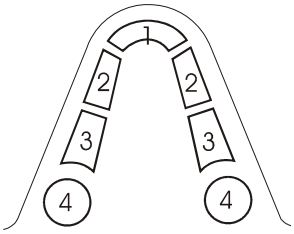
12 Have the patient gently close the jaws together.

13 Press and hold the exposure button. The system will cycle exposing only the two TMJ's.

14 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer, TMJ chin rest and TMJ angle indicator.

15 If the Ortho ID is available, mark the film with the patient's name, Id number, correction angles and notes. Process the film.

16 After the exposure return the system to the standard panoramic program by pressing the cursor buttons to move the flashing light to the standard program position. Remove Ortho TMJ accessories.



NOTE!

It is possible to choose either side TMJ by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. Either section of jaw joints (number 4) is possible to disable in P6. Though one section must always be chosen.

5.3 P7: OPEN - CLOSED TMJ, LATERAL PROJECTION

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the imaging program P7 for open and closed TMJ, on the Exposure Control Panel.

Fig 5.18. P7 & Manual mode

3 The system is in the Manual Exposure Control mode. Use technique factors per section *P6: TMJ, Lateral projection*.

4 Position the patient as in TMJ, Lateral view procedure steps through. Move the TMJ pointer *10 mm anterior* compared to jaw closed positioning.

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Fig 5.19. TMJ PA Projection

5

6 First Exposure: Have the patient close jaw. Press and keep down the exposure button. The system will cycle, exposing first the two TMJ's and will stop prepared for next view.

7 Release the exposure button. "Ready" light will be on again.

NOTE!

Do not remove the cassette nor make any selections on Control panel.

8 Second Exposure: Have the patient open the jaw. Press and keep down the exposure button. The system will cycle exposing the open TMJ's in the center of the same film.

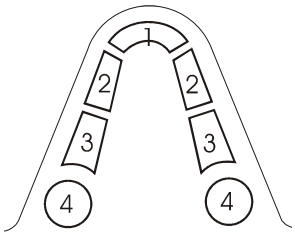
9 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer and TMJ nose support.

10 If the Ortho ID is available, mark the film with the patient's name, Id number, correction angles and notes. Process the film.

11 Return the system to the standard panoramic program.

NOTE!

It is possible to choose either side TMJ by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. Either section of jaw joints (number 4) is possible to disable in P7. Though one section must always be chosen.



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5.4 P8: TMJ, POSTEROANTERIOR PROJECTION

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the imaging program P8 for TMJ, PA projection on the Exposure Control Panel.

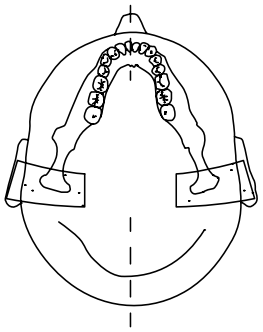

Fig 5.20. P8: Image layer

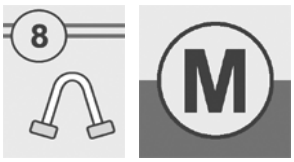

Fig 5.21. P8 & Manual mode

3 The system is in the Manual Exposure Control mode. Use technique factors per section *P6: TMJ, Lateral projection*.

4 Position the patient as in TMJ, Lateral view and procedure steps 4 through 10. Move the TMJ pointer *10 mm anterior* compared to jaw closed positioning.

Fig 5.22. TMJ PA projection

5 Have the patient open the jaw.

6 Press and hold the exposure button. The system will cycle and expose only as necessary to display the TMJ's in PA projection.

7 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer and TMJ support.

8 If the Ortho ID is available, mark the film with the patient's name, Id number, correction angles and notes. Process the film.

9 Return the system to the standard panoramic program.

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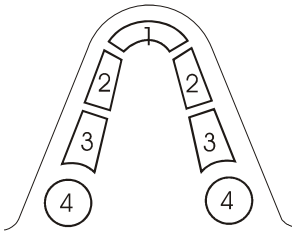
NOTE!

It is possible to choose either side TMJ by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. Either section of jaw joints (number 4) is possible to disable in P7. Though one section must always be chosen.



5.5 P9: TMJ, LATERAL & PA PROJECTION

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the imaging program P9 for TMJ, PA projection on the Control Panel.

3 The system is in the Manual Exposure Control mode. Use technique factors per section *TMJ, lateral projection*.

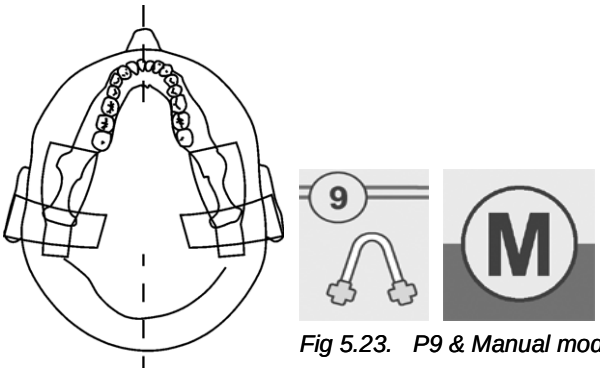


Fig 5.23. P9 & Manual mode

4 Position the patient as in TMJ, Lateral view procedure steps 4 through 10. Move the TMJ pointer 10 mm anterior compared to jaw closed positioning.

5 Have the patient open the jaw.

6 Press and hold the exposure button. The system will cycle and expose only as necessary to display the TMJ in both the lateral and PA projection to the same film.

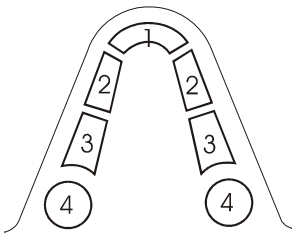
7 Release the exposure button, open temple supports and guide the patient out. Remove the TMJ pointer and TMJ support.

8 If the Ortho ID is available, mark the film with the patient's name, Id number, correction angles and notes. Process the film.

9 Return the system to the standard panoramic program.

NOTE!

It is possible to choose any section of the toothed arc by selecting the arc figure with up button. This shall reduce the radiation dose for the patient. Select the section with left or right buttons. Enable or disable the section with OK button. Either section of jaw joints, number 4, is possible to disable in P9. Though one section must always be chosen.



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5.6 P10: MAXILLARY SINUS VIEW

Fig 5.24. P10 & Manual

1 Prepare the equipment per section *Loading the panoramic cassette*.

2 Select the imaging program P10 for a maxillary sinus view on the Exposure Control Panel.

3 The system is in the Manual Exposure Control mode. Use one step higher technique factors compared to TMJ imaging:

Technique factors Maxillary Sinus Imaging				
	Child	**Juvenile**	**Adult**	**Large adult**
110 VAC	66 kV/ 8 mA	66 kV/ 13 mA	70 kV/ 12 mA	73 kV/ 12 mA
230 VAC	66 kV/ 8 mA	66 kV/ 13 mA	66 kV/ 16 mA	70 kV/ 16 mA
Note: Example with Pr 52 PCO = 66/0, GCO = 6,0.				

4 Remove the bite fork, bite fork rod and chin rest. Install the bite fork rod over the sinus rest. Install hygienic covers.

5 Direct the patient to the machine and instruct to stand as straight and tall as possible. Ask patient to take a grip on handles.

By pressing the up or down button on the Positioning Control panel adjust the carriage height so that the sinus rest is at the patient's nose height. Have patient place nose against sinus rest.

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6 Show the patient the grooves in the bite fork and place the bite fork into patient's mouth.

7 Adjust patient's head as necessary so that the front light coincides with the patient's mid-sagittal plane. Move the head support against the patient forehead and close the temple supports.

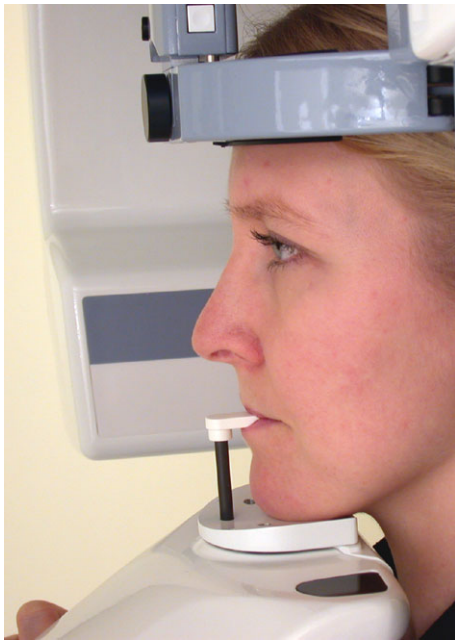

Fig 5.25. Sinus view positioning

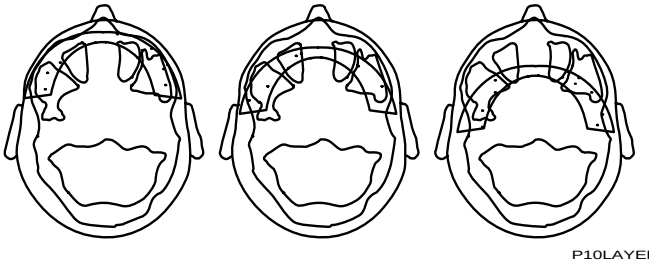

Fig 5.26. P5: Sinus view layers: anterior, premolar, molar.

8 Adjust the focal trough as necessary. Image layer is 18 mm posterior compared to Standard panoramic procedure. To set this layer 10 mm anterior or 10 mm posterior, press occlusal correction buttons. Premolar layer position is selected by pressing normal occlusion button. This will adjust the unit during the exposure.

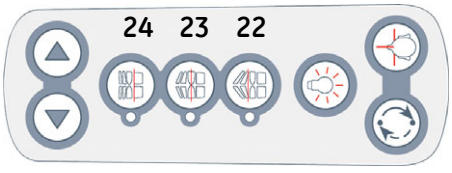

Fig 5.27. Positioning panel located at left side. Sinus layer adjustment buttons: 10 mm posterior (22), center (23), 10 mm anterior (24).

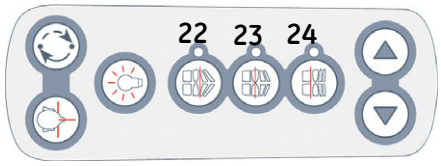

Fig 5.28. Positioning panel, localted at right side. Sinus layer adjustment buttons: 10 mm posterior (22), center (23), 10 mm anterior (24).

9 Instruct the patient to close lips, swallow and raise the tongue to the roof of the mouth. Ask the patient to breathe through the nose and remain still during the exposure.

10 Press and hold the exposure button. The system will cycle and expose the maxillary sinus region.

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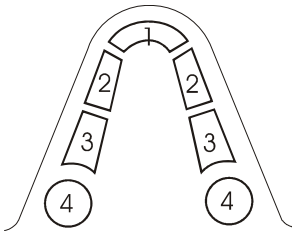
11 Release the exposure button, open temple supports and guide the patient out. Remove the bite fork and rod, reset chin rest and bite fork.

12 If the Ortho ID is available, mark the film with the patient's name, Id number, correction angles and notes. Process the film.

13 Return the system to the standard panoramic program.



NOTE!

It is not possible to choose any section of the toothed arc of the arc figure in the control panel in P10.

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6 Cephalometric procedures (optional)

Program P11 and P12 are a cephalometric imaging programs using Manual Exposure Control. Image magnification can be adjusted, ranging from 8% to 14%. Positioning steps demonstrated are for left-mounted cephalostat, steps for right-mounted cephalostat are similar.

6.1 P11: CEPHALO LATERAL PROJECTION

1 Prepare the equipment per section *Cephalostat cassette loading*.

2 Insert optional hygienic covers over ear rods and to nose support.

Fig 6.1. Cephalostat

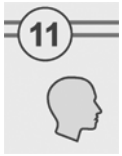
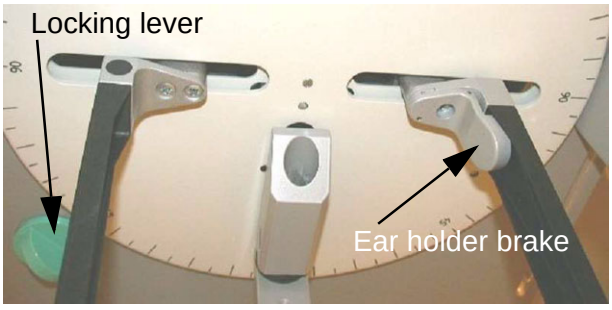


Fig 6.2. P11



3 Open the ear rods by pushing them from the top. Release the ear holder brake by holding the brake tangent down while moving.

4 Unlock the cephalostat by turning locking lever clockwise. Rotate the cephalostat from ear rods to the desired projection angle.

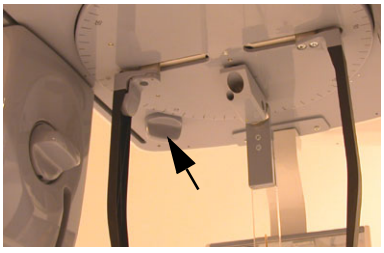


Fig 6.3. Unlock

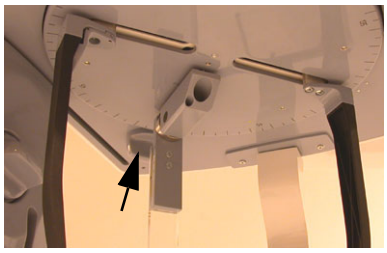


Fig 6.4. Lock

5 Turn the locking lever counterclockwise to lock the cephalostat.

6 Slide the lever to select the cephalometric collimator in the tube head. There are three choices:

18 x 24 cm AV, 18 x 24 cm AH and 24 x 30 cm AV or

8 x 10" AV and 10 x 8" AH or

8 x 10" AV and 10 x 12" AV

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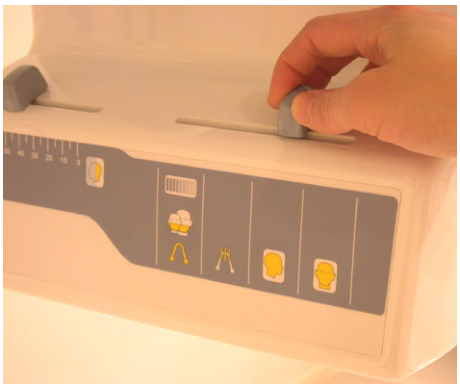

7 Verify that the cassette position is the same as the collimation.

8 Unit will be in the cephalometric mode, **P11**. This is indicated when indicator **P11** is lit.

9 Adjust the unit height. Positioning lights are off.

10 Place the patient in standing or seated position under the cephalostat. Adjust the cephalostat to proper height and introduce the ear rods to external auditory meatuses.

11 Tilt the nasion support down and set it to nasion. See that patient's head is correctly inclined. Adjust the nose support vertically and horizontally by hand.

12 The image magnification is 8% - 14%. Nose support has a scale with 1 mm tick marks. This scale will be seen on the film. Choose the desired magnification by moving the cassette holder.

Fig 6.5. Cassette holder movement

13 Read the correct soft-tissue filtering value from the scale, under the cephalostat. Set the same value to the collimator. To increase filtering set the lever to a lower value. To decrease filtering set the lever to a higher value.

Fig 6.6. Soft tissue filter scale

Fig 6.7. Lever for soft tissue filtering

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NOTE!

60 mm added to the display reading gives the actual distance from ear rods to nasion.

14 Select technique factors, kV and exposure time, mA is fixed:

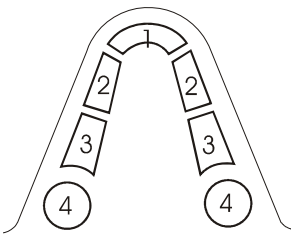
Technique factors in Ceph, Lateral Projection			
Child	**Juvenile**	**Adult**	**Large adult**
77 kV/16 mA 0.25 s	77 kV/ 16 mA/0.32 s	77 kV/ 16 mA/0.5 s	77 kV/ 16 mA/0.8 s
Note: Example with Pr 52 PCO = 77/0, GCO = 6,0			

15 Verify that "READY" light is on. Make the exposure by pressing the exposure button.

16 After the exposure, release the patient by opening the ear rods and guide him/her out. Remove the disposables.

17 Remove the film cassette. If the Ortho ID is available, mark the film with the patient's data and notes. Process the film without delay.

18 Return the system to the standard panoramic program. Lower the cassette holder.



NOTE!

It is not possible to choose any section of the toothed arc of the arc figure in the control panel in P11.

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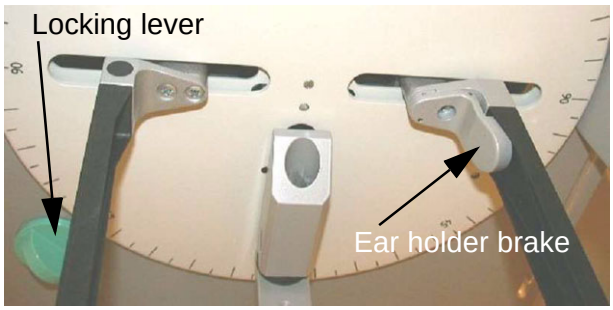
6.2 P12: CEPHALO POSTERIOR-ANTERIOR (PA) PROJECTION

This procedure can be used for PA and AP views.

Fig 6.8. P12

1 Prepare the equipment per section *Cephalostat cassette loading*.

2 Insert hygienic covers to ear rods and to nose support. Tilt the nose support away from the radiation field. Open the ear rods holders by pushing them from the top. Release the ear holder brake by holding the brake tangent down while moving.



3 Unlock the cephalostat by turning the locking lever clockwise. Rotate the cephalostat from ear rods for symmetrical view. Turn the locking lever counter clockwise to lock the cephalostat.

4 Slide the lever to **18 x 24 SV** (or **8 x 10" SV**) to select the collimator for a symmetrical view, PA or facial projection. Move the soft tissue wedge out of the x-ray beam by sliding the soft tissue lever to the value of **60**.

Fig 6.9. Symmetrical view, collimator selection

Fig 6.10. Patient positioning for PA view

5 Position the patient in standing or seated position under the cephalostat.

6 Adjust the cephalostat to proper height and introduce the ear rods to external auditory meatuses. See that patient's head is inclined.

7 Set the cephalostat cassette holder as close to the patient as possible. The distance reading, indicating magnification, can be written down for future references.

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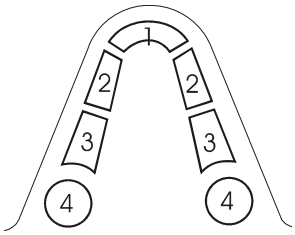
8 Select technique factors, kV and exposure time. PA / facial views have one step higher technique factors compared to the lateral projection:

Technique factors in Ceph, PA/AP Projection			
Child	**Juvenile**	**Adult**	**Large adult**
77 kV/ 16 mA/ 0.4 s	77 kV/ 16 mA/ 0.5 s	77 kV/ 16 mA/ 0.8 s	77 kV/ 16 mA/1.25 s
Note: Example with Pr 52 PCO = 77/0, GCO = 6,0			

9 Make the exposure by pressing the exposure button. After the exposure, release the patient by opening the ear rods and guide him out. Remove the disposables.

10 Remove the film cassette. If the Ortho ID is available, mark the film with the patient's data and notes. Process the film without delay.

11 Return the system to the standard panoramic program.



NOTE!

It is not possible to choose any section of the toothed arc of the arc figure in the control panel in P12.

6.3 P7: AXIAL VIEW OF THE MANDIBLE EXPOSURE

Prepare the equipment per section *Cephalostat Cassette Loading*. Insert hygienic covers to ear rods. Tilt the nasion support away from the radiation field. Open the ear rods holders by pushing them from top. Release the ear holder brake by holding the brake tangent down while moving.

Fig 6.11. Reverse Townes view

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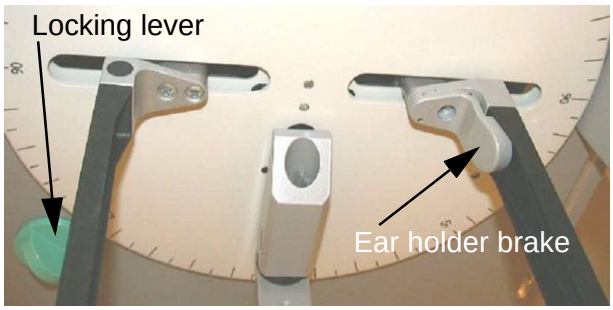

12 Unlock the cephalostat by turning locking lever clockwise. Rotate the cephalostat from ear rods for the symmetrical view. Turn the locking lever counter clockwise to lock the cephalostat.

13 Slide the lever to **18 x 24 SV** (or **8 x 10" SV**) to select the collimator for symmetric view. Move the soft tissue lever to value of **60**.

14 Position the patient seated under the cephalostat in AP-projection.

15 Gently position the ear holders into the external auditory meatuses.

16 Ask the patient to incline the head strongly backwards, as much as possible. Frankfurt horizontal plane is positioned parallel to the cassette, i.e. occlusal plane is perpendicular to the floor.

17 Set the cephalostat cassette holder as close to the patient as possible. The distance reading, indicating magnification, can be written down for future references.

18 Select technique factors and make the exposure per section *P5: PA Projection*, steps 7 to 10.

6.4 P5: REWERSE TOWNE PROJECTION EXPOSURE

1 Prepare the equipment per section *Cephalostat cassette loading*. Insert hygienic covers to ear rods. Tilt the nasion support away from the radiation field. Open the ear rod holders by pushing them from top. Release the ear holder brake by holding the brake tangent down while moving.

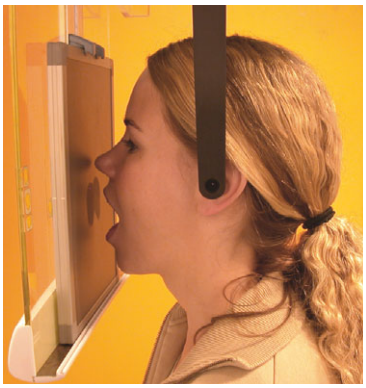

Fig 6.12. Reverse Townes view

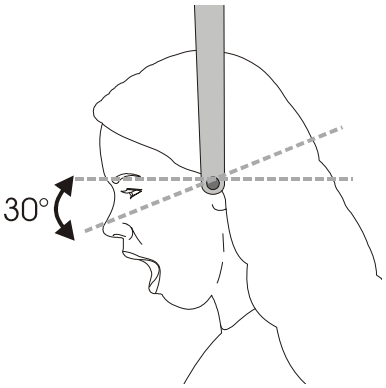

Fig 6.13. Reverse Townes view

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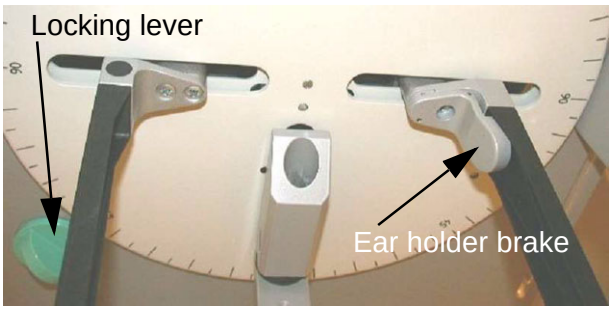

2 Unlock the cephalostat by turning locking lever clockwise. Rotate the cephalostat from ear rods for symmetrical view. Turn the locking lever counter clockwise to lock the cephalostat.

3 Slide the lever to **18 x 24 SV**
(or **8 x 10" SV**) to select the collimator for symmetric view. Slide the soft tissue lever to value of **60**.

4 Position the patient seated under the cephalostat facing the cassette.

5 Gently position the ear holders into the external auditory meatuses.

Set the cephalostat cassette holder as close to the patient as possible. The distance reading, indicating magnification, can be written down for future references.

6 Ask the patient to place the forehead and nose against the cassette, if possible.

7 Ask the patient open the mouth maximally.

8 Select technique factors and make the exposure per section *P5: PA Projection*, steps 7 to 10.

6.5 P5: WATERS VIEW EXPOSURE

1 Prepare the equipment per section *Cephalostat cassette loading*. Insert hygienic covers to ear rods. Tilt the nasion support away from the radiation field. Open the ear rod holders by pushing them from top. Release the ear holder brake by holding the brake tangent down while moving.

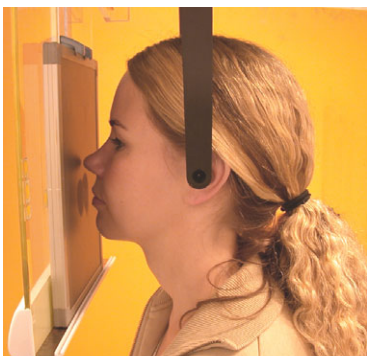

Fig 6.14. Waters view, mouth closed

Fig 6.15. Waters view, mouth open

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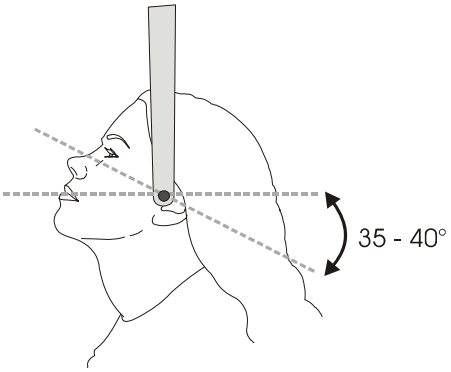
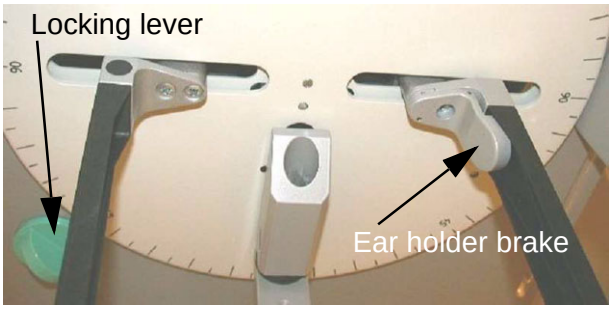


Fig 6.16. Waters view, degrees



2 Unlock the cephalostat by turning locking lever clockwise. Rotate the cephalostat from ear rods for symmetrical view. Turn the locking lever counter clockwise to lock the cephalostat.

3 Slide the lever to **18 x 24 SV** (or **8 x 10 "SV**) to select the collimator for symmetric view. Slide the soft tissue lever to value of **60**.

4 Position the patient seated under the cephalostat facing the cassette.

5 Gently position the ear holders into the external auditory meatuses.

Set the cephalostat cassette holder as close to the patient as possible. The distance reading, indicating magnification, can be written down for future references.

6 Ask the patient open the mouth and place the nose and chin against the cassette, if possible.

7 Select technique factors and make the exposure per section P5: *PA Projection, steps 7 to 10*.

6.6 P7: CARPUS VIEW EXPOSURE (OPTIONAL)

This procedure can be used for Carpus view.

1 Prepare the equipment per section *Cephalostat cassette loading*. Tilt the nose support away from the radiation field. Open the ear rods holders by pushing them from top.

2 Unlock the cephalostat by turning locking lever clockwise. Rotate the cephalostat from ear rods for symmetrical view. Turn the locking lever counter clockwise to lock the cephalostat.

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3 Slide the lever to **18 X 24 SV (or 8 x 10” SV)** to select the collimator for symmetric view. Slide the soft tissue lever to value of **60**.

Fig 6.17. Symmetrical view, collimator selection

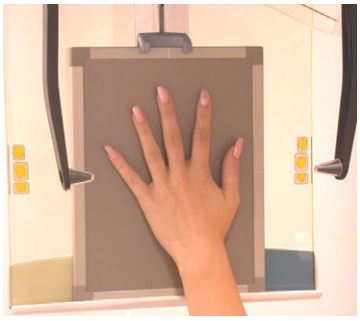

Fig 6.18. Hand positioning

4 Position the patients hand symmetrically on the casette front surface.

5 Move the ear holders to the outermost position.

6 Select technique factors. Recommended technique factors for Carpus projection are 60 kV, 12 mA and 0,16 s with Kodak Lanex Medium intensifying screen and Kodak TMG film.

7 Make the exposure per section P5: *PA Projection, steps 7 to 10.*

NOTE!

For U.S.A: This section is not valid in U.S.A. before Carpus projection imaging method is approved as a legal imaging method of this Cephalostat model.

CAUTION!

Before taking Carpus image make sure this imaging method is approved by local authorities of your country.

6.7 P13: ORTHO TRANS MANDIBLE EXPOSURE (OPTIONAL)

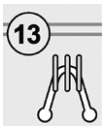

Fig 6.19. P13

6.8 P14: ORTHO TRANS MAXILLA EXPOSURE (OPTIONAL)

Fig 6.20. P14

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7 Imaging technique

7.1 RECOMMENDED FILM & SCREEN COMBINATIONS

The Orthopantomograph® OP200 is supplied with Kodak Ektavision, Kodak Lanex Regular or Kodak Lanex Medium intensifying screens. The factory default exposure control values are set according to supplied screens/films.

Other film/screen combinations can be used with the OP200. However, different image characteristics may result and/or reprogramming of the unit may be required.

7.2 AUTOMATIC EXPOSURE CONTROL (AEC)

When the OP200 is turned on, it is set as a default to Standard Panoramic with Automatic Exposure Control. The AEC sensors located in the cassette holder will monitor the amount of radiation the film is receiving and automatically set the exposure factors for proper image density. After the exposure the adjusted values are shown on the display.

The AEC will stay engaged with panoramic procedures unless set to manual mode.

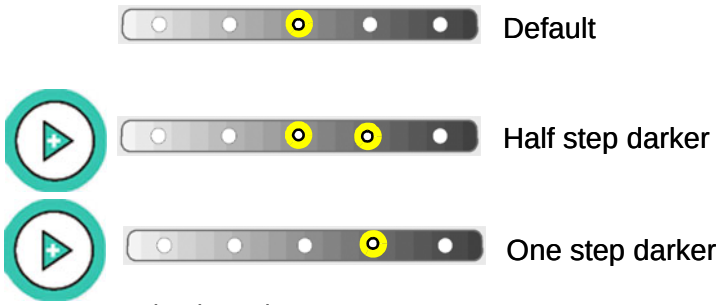

Fig 7.1. AEC density scale

The film density can be changed while keeping AEC engaged:

1 A darker or lighter film can be accomplished without disengaging the AEC by resetting the automatic exposure density scale on the Control Panel.

2 Press the down button twice to move the flashing light from the standard panoramic position to the central light on the automatic exposure density scale.

3 To make the film darker, press the left button to move the flashing light to the right. Each change increases the radiation output by approximately 12 percent.

4 To make the film lighter, press the cursor button to move the flashing light to the left. Each change decreases the radiation output by approximately 12 percent.

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NOTE!

AEC density is controlled in half steps. A half step between two indicators is shown with both indicators lit.

7.3 EXPOSURE TECHNIQUE FACTORS

OP200 has a flexibility to use a variety of exposure technique factors, ranging from 57 kV to 85 kV and from 2 mA to 16 mA. The kV/mA values used depend on OP200 software settings, i.e. constant contrast kV setting defined in Pr 52 and also on line voltage.

In the following charts each "ball" represent a kV/mA pair that can be used with the selected line voltage, with imaging programs P1 to P10. Exposure time is fixed with programs P1 to P10.

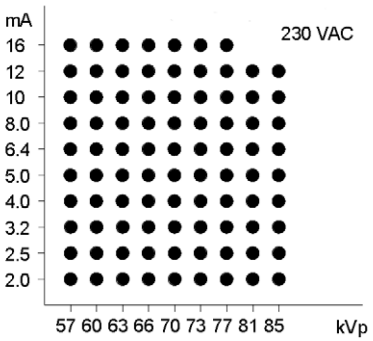

Fig 7.2. Exposure factors with 230 VAC

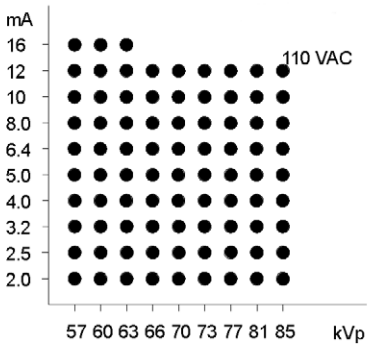

Fig 7.3. Exposure factors with 110 VAC

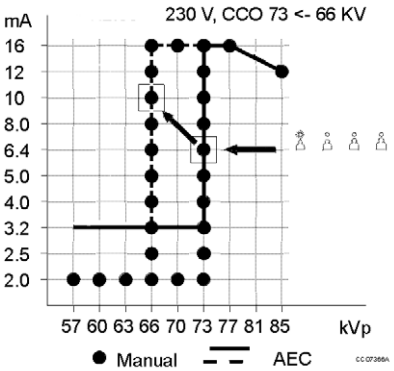

Fig 7.4. Example: When kV is lowered and mA increased, the same radiation output level results

Exposure factors shown on the control panel are automatically selected by the OP200 software based on settings done during the installation. These settings can be changed. See *User Program Chapter in OP200 User Manual, Pr 52* for details.

The following charts show examples of exposure values with different software settings. A "ball" represents a kV/mA value used in Manual

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mode and a "line" represents kV/mA values which can be selected by the Automatic Exposure Control (AEC).

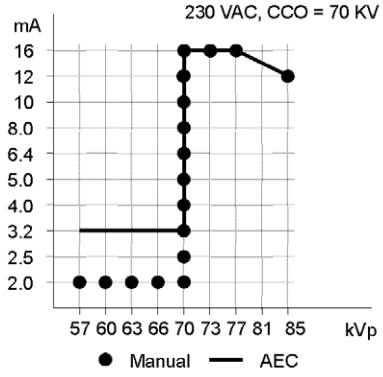

Fig 7.5. Possible exposure values when constant contrast has value of 70 kV and supply voltage is 230 VAC.

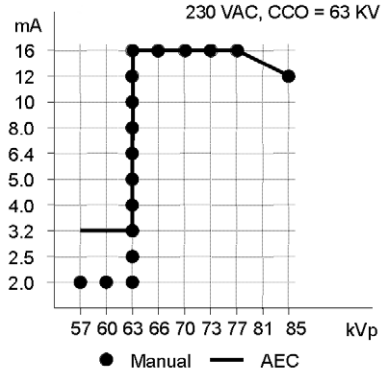

Fig 7.6. Possible exposure values when constant contrast has value of 63 kV and supply voltage is 230 VAC.

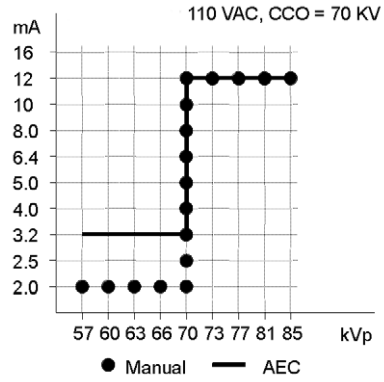

Fig 7.7. Possible exposure values when constant contrast has value of 70 kV and supply voltage is 110 VAC.

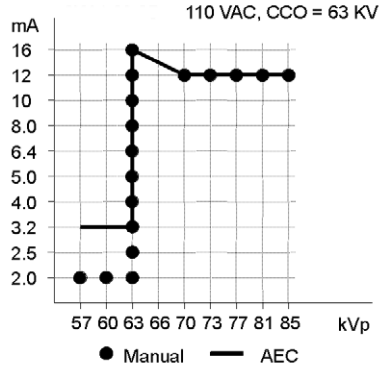

Fig 7.8. Possible exposure values when constant contrast has value of 70 kV and supply voltage is 110 VAC.

7.4 MANUAL MODE

If desired, the exposure technique factors can be set manually with the AEC disengaged. The technique factors can be set either by patient size or by specific kV and mA factors.

1 To set the unit to manual mode first press the down button once to move the flashing light from the standard panoramic position to the AEC (A) position. Then press the right button once to move the flashing light to manual (M) position.

Fig 7.9. Manual mode

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2 At this time the light over the juvenile of the pre-programmed exposure factors should be lit. To change the exposure values, first press the down button two times until the flashing light is over the patient size symbol. To select proper patient size, press the right or left button.

3 To set specific kV and mA technique factors press the down button until the flashing light is at the kV and mA section. By pressing the right or left button the displayed flashing value can be increased or decreased.

4 Panoramic and Special procedures can use the following technique settings:

Panoramic, TMJ and Sinus Imaging Procedures Technique Factors	
KV	57 - 60 - 63 - 66 - 70 - 73 - 77 - 81 - 85
mA	2 - 2.5 - 3.2 - 4 - 5 - 6.4 - 8 - 10 - 13 - 16
kV/mA pairs	57/2 - 85/13 Combined values depend on Pr 52 settings.
Exposure time	8.0 - 17.6 s. Fixed for each imaging procedure.

NOTE!

kV and mA can be selected independently in Manual mode. With this option, kV can be selected in steps of 1 kV. See Service Program Manual, section Sr 89 COP, option 4 FE for details.

5 Technique factors for patient size symbols can be programmed for Panoramic and Special procedures. See *User Program Chapter in OP200 User Manual*, section Pr 52 for details.

6 Cephalometric procedures use a fixed mA, while kV and exposure time can be selected.

Cephalostat Imaging Procedures Technique factors	
kV	60, 63, 66, 70, 73, 77, 81, 85
mA	13 mA
s	0.1, 0.12, 0.16, 0.2, 0.25, 0.32, 0.4, 0.5, 0.63, 0.8, 1.0, 1.25, 1.6, 2.0, 2.5, 3.2

NOTE!

kV and exposure time can be selected independently in manual mode. With this option, kV can be selected in steps of 1 kV. See Service Program Manual, section Sr 89 COP, option 4 FE for details.

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7 These programmed values are for guidance only and your Orthopantomograph® x-ray films may be darker or lighter depending on patients.

8 To adjust for optimum film quality select one density setting lower or higher in Automatic Exposure Control and one point higher or lower technique factors in Manual Exposure Control. Expose again. Consult your dealer for detailed information.

7.5 TEST MODE

The movements of the unit can be performed without radiation. This may be useful for children or uncooperative patients to demonstrate the operation prior to taking the exposure.

1 To set the unit to test mode first press the down and right buttons to move the flashing light from the standard panoramic position to the AEC (A) position. Then press the right button twice to move the flashing light to the test mode **(T)** position.

Fig 7.10. Test mode

2 The unit will now operate without X-ray emission.

NOTE!

Test mode in program 7 for combined lateral TMJ images simulates only the first exposure.

3 To return to the AEC (A) mode press the left button twice or once.

7.6 FILM PROCESSING

Proper processing is very important for obtaining high quality Orthopantomograph® radiographs. It is important that both the dark room and processing system are in top condition.

Store films in a cool dry dark place in vertical position to reduce film fog and static. Always use older lot first. Process the film immediately after exposure.

Dark room

Panoramic film is extremely sensitive to light. The dark room cannot have any light leaks of any kind. If in doubt, place a coin on an undeveloped sheet of film for two minutes and then process the film. If the outline of the coin is visible, then light leaks exist which must be corrected.

Along with light leaks an improper safelight can cause film fogging. The recommended safelight is a Kodak GBX-2 located at least 1.2 m (4 ft.) from the working area.

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Processing

The OP200 film can be processed in either manual tanks or with automatic film processor. In both cases the processing chemicals strength and temperature are critical to obtaining proper imaging.

The processing chemicals must be changed frequently based on the chemical manufacturer's recommendation. Both time and use cause a degradation of chemical strength.

Manual tanks and some automatic processors need to have the solutions replenished based on usage. Refer to the manufacturer's recommendation.

7.7 MEASUREMENTS FROM THE IMAGE

In normal panoramic mode films the vertical dimension must be divided by a factor of 1.3. Horizontal dimensions should not be measured because the horizontal magnification is accurate only in the center of focal trough (1.3 in panoramic and TMJ lateral, 1.8 in TMJ PA) and changes rapidly when moving away from focal trough. Complete table of magnification factors can be found in Chapter *Technical Specifications* at the end of this manual.

WARNING!

In panoramic images the horizontal and vertical magnifications are the same only in the focal trough. Manufacturer assumes no liability on the accuracy of the measurements from the x-ray image. Angulation of the object being imaged affects on the dimensional accuracy on the film.

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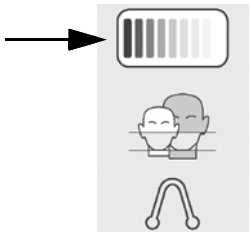
8 Special features

8.1 QUALITY ASSURANCE

The Orthopantomograph® OP200 can produce a self diagnosing film for checking the quality of the exposure and the film processing.



1 Start by establishing a processing standard with new processing chemistry and time and temperature verified.

2 Remove the bite fork with bite fork rod. Insert loaded cassette.

3 Set the primary collimator to the QA position. In OP200 lift the lever to the left and then up for two steps. QA selection is indicated in control panel with lowest kV/mA values (57 kV/2 mA) and a moving indicators in the AEC density scale.
Check that the soft tissue filters are in **value 60** in cephalostat unit.

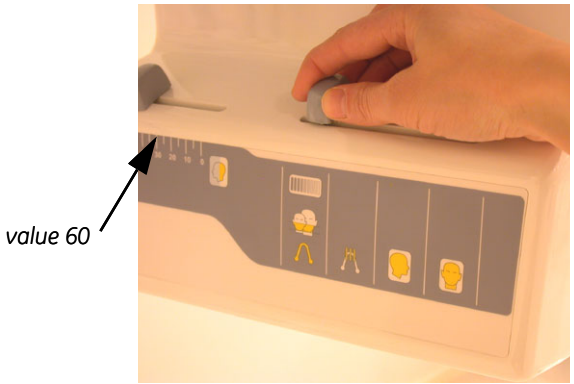
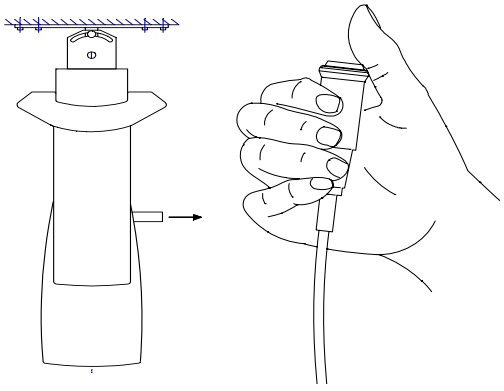


Fig 8.1. OC200 QA collimator selection

4 Press the movement button in the patient positioning panel. The rotating unit turns towards the column.



5 Press and hold the exposure button. The rotating unit will remain stationary while the cassette moves and is exposed with increasing kV/mA values.

6 Set the primary collimator back to the panoramic position and insert the bite block.

7 Process the film and place on file for future reference.

8 On a regular basis perform steps 2 through 7.

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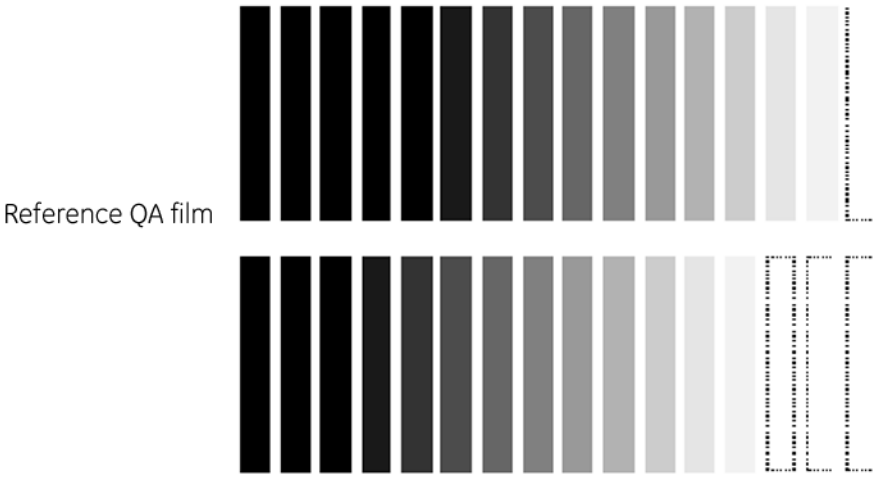
9 After processing the film compare it to the reference film. If the contrast steps differ by more than two (2) the processing system must be checked and corrected. Examples:

Current QA film, where the image density is lighter indicating a change in the processing.



8.2 EXPOSURE COUNTER

The total number of exposures the system has taken is automatically counted and can be read any time.

1 Turn the OP200 power on, and wait until the normal display appears. Make sure that one of the programs P1- P12 is selected.

2 Press the OK button.

3 Several numbers will be displayed on the Control panel and other indicators will be turned off.

4 Numbers will be shown for a few seconds or until the OK button is released.

5 The total number of exposures is read from top to bottom. The example above is **12 345** exposures.

6 Resume to normal operation.

NOTE!

The display may also show more numbers (0-2000) and blink all led indicators momentarily. This indicates the number of free exposures before the unit shuts down. This feature may have been activated for trial units. Contact your dealer for details.

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8.3 PREVENTIVE MAINTENANCE REMINDER

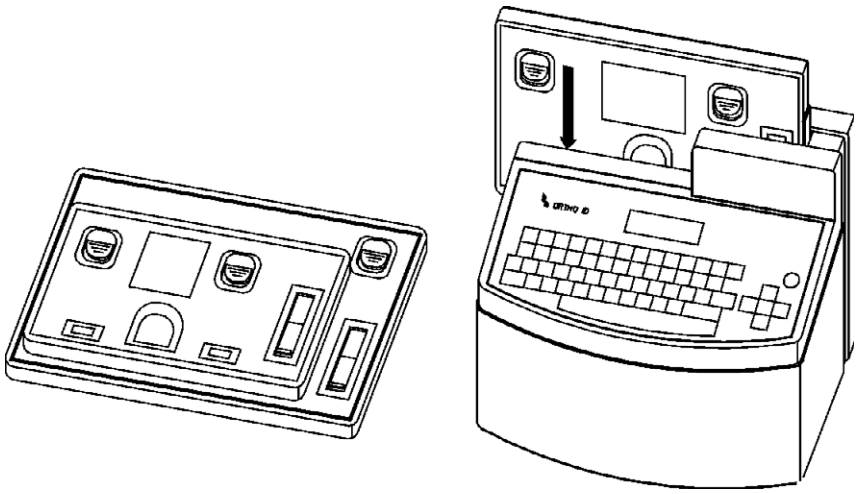
The exposure counter also provides a means of reminding when maintenance is due. After every 2000 exposures a special reminder message, "Ch 8 PSE", will be displayed for a few seconds when the power is switched on.

This message indicates that the user should contact the authorized dealer for the scheduled maintenance. We recommend that this unit will be provided for regular service for best performance and reliable operation. See Program Pr 59 PSE for details.

The message display does not affect the equipment operation. It will be reset during the maintenance service procedure, or it can be reset by the user.

8.4 ORTHO ID FILM MARKING

Optional ORTHO ID film marking system marks patient data and OP200 technique factors information on both panoramic and cephalometric films. Standard window type panoramic and cephalometric cassettes are used for marking. Patient data can be pre-entered or typed in before or after the exposure, according to user preferences. ORTHO ID can be used with any OP200 or OC200 model. Please refer to Ortho ID manuals for details.



8.5 OP200 CR MODEL FOR COMPUTERIZED RADIOGRAPHY

Digital imaging OP200 and OC200 models are available for computerized radiography. These models have different type of panoramic cassette holder for 24 x 30 cm image plate. The operation is similar to other OP200 models.

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8.6 FREE SELECTION OF kV AND mA

OP200 technique factors are normally selected based on kV target level set with the constant contrast program (Pr 52), where kV and mA values are tied to each other. It is possible to configure OP200 so that kV and mA are selected independently in Manual mode. Please consult your dealer to activate this software option. When activated, this feature has no effect on the AEC mode and on preprogrammed technique factors.

In Manual mode the tube voltage can be selected in steps of 1 kV. When the led indicator for kV/mA values is lit, first kV display is blinking. Select kV value by pressing the right or left button.

NOTE!

Pressing the button longer causes kV to change in larger steps.

Then press the down button; mA display is blinking. Select the mA value.

mA can be selected from the fixed table: 2.0, 2.5, 3.2, 4.0, 5.0, 6.4, 8.0, 10, 13 and 16.

NOTE!

Cephalostat has a fixed mA value.

NOTE!

*If the kV is increased with maximum mA selection, the mA value is automatically decreased when the product of kV * mA exceeds the allowed X-ray tube rating.*

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9 Understanding the OP200 radiograph

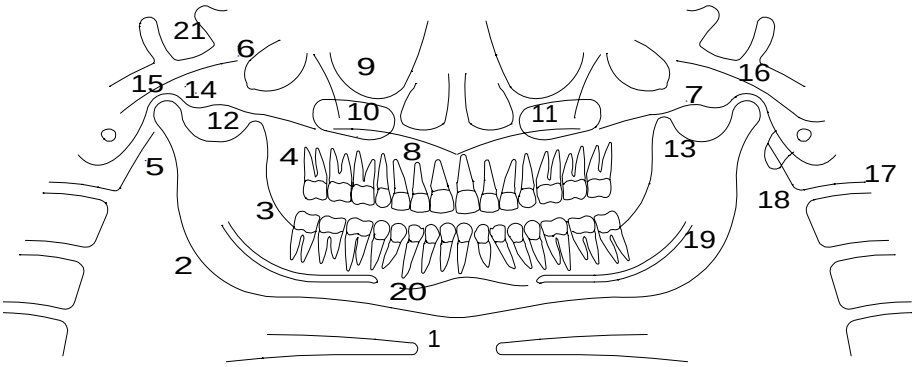

Fig 9.1. Drawing of OP200 radiograph with anatomical landmarks and structures

Typical OP200 radiograph with anatomical landmarks and structures.

1 hyoid bone
2 angle of mandible
3 external oblique line
4 maxillary tuberosity
5 styloid process
6 middle cranial fossa
7 zygomatic arch
8 palate
9 orbit
10 septa in maxillary sinus
11 maxillary sinus
12 pterygoid plates
13 coronoid process
14 articular eminence
15 mandibular condyle
16 glenoid fossa
17 vertebra
18 ear lobe
19 mandibular canal
20 mental foramen
21 Sella Turcica

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10 Failure diagnostics

The OP200 has many safety functions and features assuring the safe operation of the equipment. In the event of certain user failures or system malfunction the unit will not produce x-rays and a failure code will be displayed on the Control Panel.

10.1 FAILURE MESSAGES

In case of malfunction, the unit displays a failure message. Various letters and numbers will be displayed in the technique factors display positions next to kV, mA and s, e.g. **Ch 6 POS**. Failure code classification is displayed next to kV. A special 2-digit failure code number is displayed next to mA.

10.2 kV DISPLAY

The kV-display indicates the nature of the failure, whether it is caused by user (e.g. exposure button prematurely released by operator), environment (e.g. low line voltage) or protection in the unit (e.g. tubehead too hot), or whether there is a serious defect in the unit, which disables the complete operation (e.g. program memory error):

Ch	**Ch**eck. A failure caused by the user (e.g. exposure button prematurely released by operator).
Sy	**S**afet**y**. Temporary malfunction or protection in the unit, caused by the unit or environment. Operation is prohibited or terminated to protect the operator, patient and the unit itself. (E.g. the temperature in the tube head assembly is too high due to intensive use). After the corrective action, unit can be used.
Er	**Er**ror. There is a serious defect in the unit, and the operation is therefore prohibited to protect the operator, patient and the unit itself. (E.g. failure in the CPU Board).

WARNING!

*If the unit is further used, "**er**" failure may cause malfunction.*

10.3 mA DISPLAY

The mA-display indicates the actual numeric failure code by two-digit number. Each failure code has a unique number, to differ one malfunction from another:

kV	Ch	Sy	Er
mA	1 to 9	20 to 31	40 to 46

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10.4 TIME DISPLAY

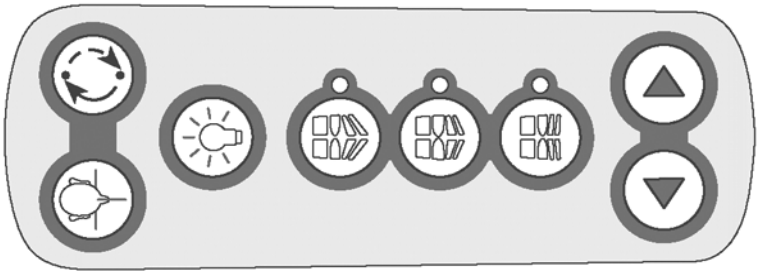
The exposure time display indicates the alphanumeric short form explanation of the malfunction. This reminds the user or the serviceman of what the actual numeric failure code means, or sometimes numeric information of the malfunction. The display may also blink telling more information about the fault, for example in Sy 20 where blinking display also tells the waiting time for tube head cooling.

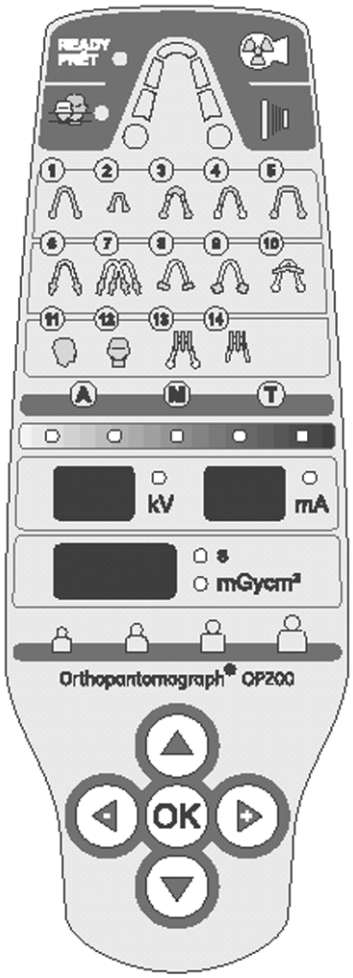
kV	Time display
Ch-failure	CAS, COL, POS, rEL, PSE, rEo, or numbers
Sy-failure	HHo, Inu, FIL, AEC, EEP, Por,PoC, PoL, PoH, PoU, or numbers
Er-failure	CPU, FIL, InP PAy

10.5 RESETTING FAILURE

Ch failure codes can be reset by correcting the reason for the failure code. **Ch** and **Sy** failures can be reset by pushing any button in the control panel or in the patient positioning panel. If **Sy** failure appears repeatedly call your local dealer. Exception is **Sy** 20 failure which appears when the tube head is too hot and you have to wait for cooling. This is a normal operation if you are exposing a lot and in warm places.

Er failures can not be reset. Switch the unit off and on, to test whether the failure was only temporary.





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10.6 MULTIPLE FAILURE CODES

In the case of multiple errors press "OK" button to display other failure codes.

Check	Interpretation
Ch 1 CAS	CASSETTE: Panoramic cassette not installed properly, or not replaced since previous exposure
Ch 2 CAS	CASSETTE: Cephalostat cassette not installed properly, or not replaced since previous exposure
Ch 3 COL	COLLIMATOR: Collimator not in right position
Ch 4 COL	COLLIMATOR: Collimator not in cephalostat position when ceph selected
Ch 5 ***	LINE VOLTAGE: Line voltage out of limits - Approximate line voltage (***) displayed in s-display
Ch 6 POS	POSITION: System not in Start position, - Start button not pressed prior to QA procedure or - Collimator in QA position when taking a panoramic exposure
Ch 7 rEL	EXPOSURE SWITCH: Exposure button prematurely released by operator - Blinking display tells also exposure time (***) in s-display
Ch 8 PSE	PREVENTATIVE SERVICE: Preventative service reminder after 2000 exposures
Ch 9 rEo	REMOTE EXPOSURE: Exposure was initiated from control panel, while remote exposure has been selected.
Ch 11 PAr	EXPOSURE VALUES: (parameters) out of range.
Ch 12 dCC	DOSE CALIBRATION: constant missing or out of limits.

All error messages are explained in detail on *OP200 Troubleshooting Manual*.

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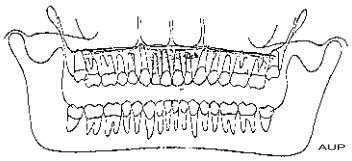
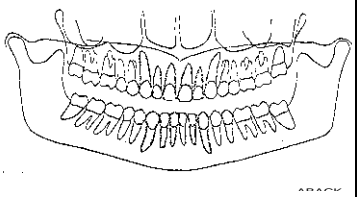
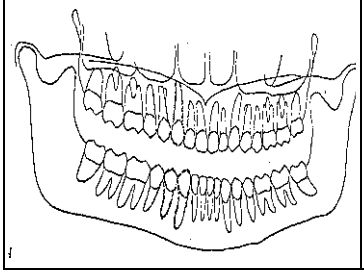
11 Diagnosing image quality problems

High quality radiographs with sharp contrast and good detail present optimum diagnostic information. Images with less quality are usually the result of one or more common problems, which are discussed here.

11.1 PATIENT POSITIONING

Problem	Possible Cause	Remedy
Incisors and canines narrow and unsharp. Overshadow in molar and premolar areas. Rows of teeth are compressed. 	1 Occlusal correction of focal trough set was too far posterior 2 Image layer light was not obeyed 3 Bite block was not used	1 Check patient positioning with light lines and occlusion correction buttons 2 Check patient positioning with light lines and occlusion correction buttons 3 Insert bite block
Incisors and canines wide and unsharp. Rows of teeth widened. 	1 Occlusal correction of focal trough set was too far anterior 2 Image layer light was not obeyed 3 Bite block was not used	1 Check patient positioning with light lines and occlusion correction buttons 2 Check patient positioning with light lines and occlusion correction buttons 3 Insert bite block
Teeth appear wider on one side and narrower on the opposite. Ramus widths are different on opposite sides. 	1 Midsagittal line was not obeyed 2 Patient's head was not in center position	1 Check patient's mid sagittal plane with light line 2 Check that patient's head is centered

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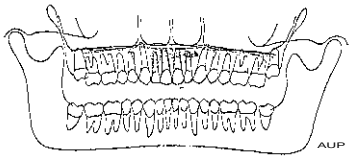
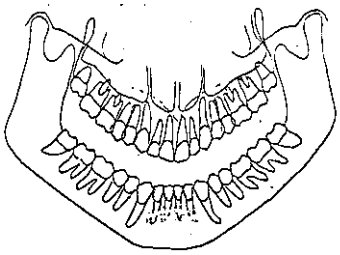
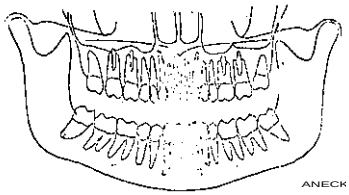
Problem	Possible Cause	Remedy
The shadow of hard palate is exposed over maxillary molars. Row of teeth has a wavy appearance. TM joints are exposed outward. Image is not "smiling". Mandible is imaged sharper than maxilla. 	Patient head was tilted back	Check FH plane
Rows of teeth curved upwards. Mandibular incisors are unsharp. TMJ joints exposed high and are often cut off from the image. Image is "smiling" too much. 	Patient head was tilted forward	Check FH plane
Middle area of the image too bright and unsharp. Spine shadow. 	1 Patient's neck was not stretched 2 kV compensation was not used or LOW compensation was used with Large adult patient	1 Stretch patient's neck 2 Enable or increase kV compensation
Rows of teeth overexposed.	Tongue was not against the roof of palate.	Ask patient to swallow and place tongue against the roof of palate.

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Problem	Possible Cause	Remedy
TMJ's exposed on different heights on image. Bilateral distortion in molar and premolar regions.	1 Patient was tilted to one side 2 Midsagittal light line was not obeyed.	1 Check midsagittal plane and center patient's head. 2 Check mid sagittal plane and center patient's head.
Rows of teeth exposed too high. TMJ's cut off.	1 Chin was not resting on chin support 2 Patient was positioned too high	1 Check patient positioning and type of bite fork rod. 2 Check patient positioning and type of bite fork rod.
Rows of teeth exposed too low. Mandible not exposed completely to the image.	Chin rest was not used with bite fork.	Install chin rest.

11.2 FILM DENSITY AND CONTRAST

Problem	Possible cause	Remedy
Images are too light	1 AEC density setting was too low. 2 Manual technique factors used were too low. 3 A problem with the processing. 4 AEC control or beam alignment was misadjusted	1 Adjust the density to a higher value. 2 Increase technique factors 3 Make the "QA" film and check the processing (chemicals, temperature and time) 4 Call service.

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Problem	Possible cause	Remedy
Images are too dark	1 AEC density setting was too high. 2 Manual technique factors used were too high. 3 A problem with the processing. 4 AEC control was misadjusted 5 Leaded cassette was used with AEC.	1 Adjust density to a lower value. 2 Increase technique factors. 3 Check the processing. 4 Call service. 5 Check the cassette. Use one without lead.
Lack of image contrast	1 kV used was too high 2 Film-screen not optimum 3 Fogged film	1 Lower the kV setting. See P.52 CCO for details. 2 Check the film and screens. 3 Check the film. Process a piece without radiation.
Image is fogged. Metal fillings don't appear as bright unexposed areas.	1 Film was re-exposed during the processing 2 Light leak in dark room 3 Safety light was not appropriate to film in use 4 Useless film (wrong storage or expired lot)	1-4) Check your film lot and dark room
One side of the film overexposed.	1 Film has been previously exposed to light 2 Light leak in dark room 3 Cassette was not properly closed	1 Check your film inventory and dark room 2 Check your film inventory and dark room 3 Check cassette locking

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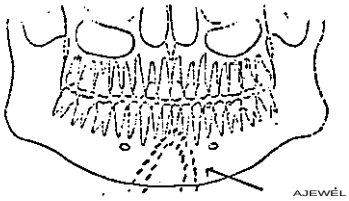
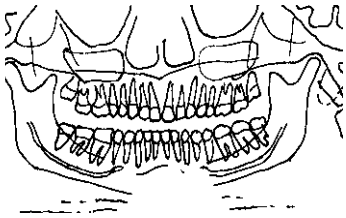
11.3 ARTEFACTS

Problem	Possible cause	Remedy
Irregular, bright shadows or artefacts 	Patient was wearing metal objects, such as earrings, necklace etc.	Ask patient to remove objects.
An unexposed area is shown down in the lower middle section of the image. 	Lead apron was misplaced.	Check the lead apron positioning.
Cassette hinges seen on film.	Cassette was inserted in reverse.	Install the cassette with flat side facing the THA.
Bright irregular spots or lines always on the same film location.	Dirty or worn screens.	Check and clean the screens. Replace when needed.
Scratches and residues on film.	Problem with processing: processor was not cleaned or worn rollers, old chemicals.	Check processing and processor and service when needed.
Partial lack of detail and motion artefacts. Irregular vertical bright lines on film.	Patient has moved during the exposure.	Retake the image to a new film.
Vertical dark lines on film.	Patient's shoulder was in touch with machine parts.	Check patient positioning.
One side of the film unexposed.	Exposure button was released prematurely.	Retake the image to a new film.

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Problem	Possible cause	Remedy
Lightning like pattern on film.	1 Discharge of static electricity. 2 Film was loaded by sliding it over screens.	1 Load the film without sliding it over screens. 2 Check dark room humidity level.
An unexposed 10x50 mm area in the film corner.	Window cassette for Ortho ID was used. Area is for film marking.	None.
Right and left film sides are unexposed. TMJ's are not shown.	Orthogonal procedure was mistakenly used.	Select correct panoramic procedure.
CEPH: Double image on film.	Cassette has not been replaced after previous exposure.	Reload or replace the cassette.
CEPH: Unexposed rectangular on the image.	1 Cassette was not in right place. 2 Ceph collimator was not correctly selected.	1 Align the cassette according to the ceph view. 2 Select correct collimation.
CEPH: Lateral view has 2 ear holder pins.	1 Cephalostat lock was not locked 2 Ear holders were misaligned	1 Lock it 2 Call service
QA: Light horizontal line on film	Bite block was left on place	Remove the bite block *Note: QA film can be used.*

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11.4 UNIT OPERATION

Problem	Possible cause	Remedy
READY not lit.	1 Unit is not ready for exposure.	1 Check the collimator, program selection and cassette. If the unit is still not ready, momentarily press exposure button: Failure message will be displayed. Make the corrective measures.
Patient's back head is touching the x-ray tube during the exposure.	1 Patient's head inclination was not correct 2 Patient is too big for the unit. 3 Patient has slumped.	Process the film. If the film is not accetable then: 1 Check the head position and retake the film. 2 Check the patient positioning. Make the exposure even though the head may touch the tube head.
Patient's shoulders are touching the x-ray tube or cassette holder.	Patient is too big for the unit. Wide shoulders.	Reverse patient's hands on handles: left to right side handle and vice versa.

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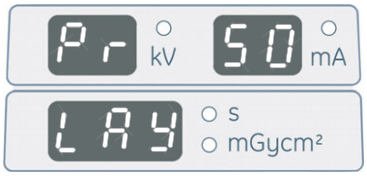
12 How to use the user programming mode

12.1 GENERAL

The Orthopantomograph® OP200 is a panoramic x-ray equipment with the possibility of linear tomography programs for producing longitudinal and cross-sectional tomograms of the dentition. This software can be used with any OP200 or OC200 model.

Software is divided into two parts. User programs (“Pr”) are accessible by the user and they have features for configuring the unit for daily use and for changing technique factors to optimize the image quality.



Maintenance and Service programs (“Sr”) are for technical people for installation and service. Tools are required to access “Sr” programs.

This manual covers the features of the “Pr” programs OP200. Please refer to the OP200 *Service Program Manual* for “Sr” program features.

12.2 INSTALLATION & UNIT CONFIGURATION PROGRAMS

“PR” USER PROGRAMS	
Pr 51 PUS	POWER UP SETTINGS: Select imaging program and exposure control mode for the control panel display after OP200 power-up.
Pr 54 Arn	ROTATING UNIT AUTORETURN: Easy patient exit after the exposure by returning the rotating unit to the nearest patient exit position.
Pr 55 HUP	CASSETTE HOLDER AUTOLIFT: Lifts automatically the cassette holder after inserting the panoramic cassette.
Pr 56 HLI	CASSETTE HOLDER VERTICAL LIMIT: Low ceiling application to limit cassette holder vertical travel below the column top.
Pr 57 Hon	HOME SIDE FOR EXPOSURE START: Select exposure in one direction, clockwise or counterclockwise rotation , or exposure in both directions.

"PR" USER PROGRAMS	
Pr 65 doS	CONFIGURE TIME/DOSE DISPLAY: Time/dose display displays according to the selection seconds or dose during the image capturing.

12.3 PROGRAMS AFFECTING TO IMAGE QUALITY

"PR" USER PROGRAMS	
Pr 50 LAY	LINEAR TOMOGRAPHY IMAGE LAYER: Select image layer thicknesses, number of images and the choice of longitudinal and / or transversal images for three areas of interest (anterior, premolar and molar)
Pr 51 PUS	POWER UP SETTINGS: AEC mode or Manual mode and the default imaging program for the control panel display after OP200 power-up.
Pr 52 GCo & PCo	CONSTANT CONTRAST & DENSITY: Set general technique factor and program spesific offset for all imaging programs.
Pr 58 Con	VERTEBRAE SHADOW COMPENSATION: kV-compensation at spinal column OFF = no compensation. LO = compensation by one mA steps HI = compensation by two mA steps ASC = Automatic Spine Compensation

12.4 OTHER PR PROGRAMS

"PR" USER PROGRAMS	
Pr 53 nor	RESUME NORMAL SETTINGS: Reset user program memory parameters for selected "Pr" programs.
Pr 59 PSE	PREVENTATIVE SERVICE MESSAGE: Clear, disable or enable the Preventative Service Request message after installation, maintenance or service.
Pr 60 bEP	PANEL BEEP: Enable or disable the response "beep" when pushing any button in the display panels.
Pr 61 CLC	CLEAR EXPOSURE COUNTER: Clear the resetable exposure counter.
Pr 62 Err	LAST FAILURE CODE: Display of the last storable failure code for this unit.

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"PR" USER PROGRAMS	
Pr 66 COU	COUNTERS: Reset and view various exposure counters.

12.5 HOW TO USE THE USER PROGRAMMING MODE

1 To begin the setting switch the OP200 power on.

2 Wait for a moment, while the OP200 performs a self check. After a tone the default operating mode is displayed on the control panel. Information is defined in user program Pr 51 PUS, which guidelines are described in the next chapter.

NOTE!

Er 45 InP shall be displayed if the exposure button, any of the buttons in the patient positioning panel or any of the buttons in the control panel is pressed when switching the OP200 D power on.

3 Press and keep down the OK button until the user programming mode is displayed after the tone, e.g. "**PR 52 GCO**".

NOTE!

If the button is released too early, program resumes to the normal operation mode. In that case start again from step 3.

4 Use up and down buttons to select one of the **Pr** programs. Press OK button to confirm the selection. The program parameters shall be displayed.

5 Use up and down buttons to select the option in the program.

6 Use left and right buttons to change the settings. Follow the guidelines for each " **Pr** " program described in the next chapter.

7 Press OK button once to store the changes and exit the user program.

NOTE!

If you change the parameters and forget to press OK or switch the power off, the storing of any changes failed.

8 Press OK button for a while to exit from the user programming mode. The tone is heard as the normal display is resumed. Another way to exit the user programming mode is to switch OP200 power off, wait for 15 s, and switch the power on again.

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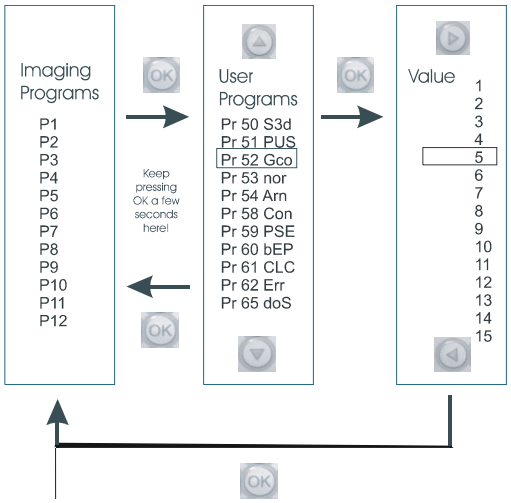
EXAMPLE 1: A user wants to change the constant dose settings of the unit.



9 Press and keep down OK button to enter the user programming mode. The tone is heard while pressing. Use up and down buttons to select PR 52 gCO and press OK. Use up and down buttons to select the dose value when time display starts blinking. Set the desired density value with right and left buttons. Use OK button to store the changes. A text PASS will display on control panel to confirm the setting been saved. Press and keep down OK to return to the normal operating mode.

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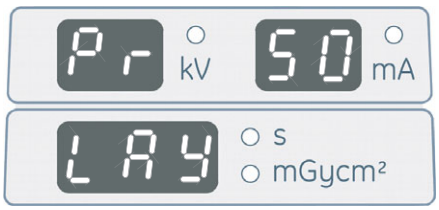
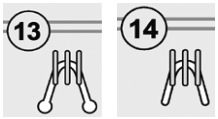
13 User program features

13.1 PR 50 LAY: LINEAR TOMOGRAPHY IMAGE LAYER (OPTIONAL)

For the linear tomographic exposure the image layer thickness in longitudinal and transversal tomograms can be selected in the “Pr 50 LAY” program. This program is displayed only when the Ortho Trans imaging programs P13 and P14 have been activated.



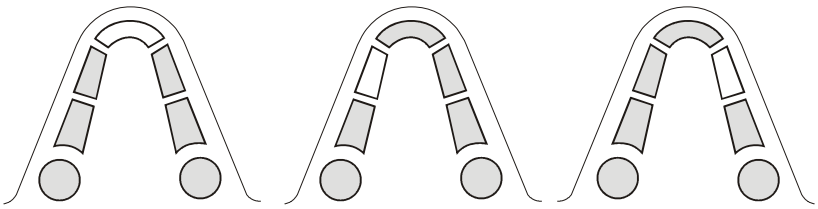


Programming

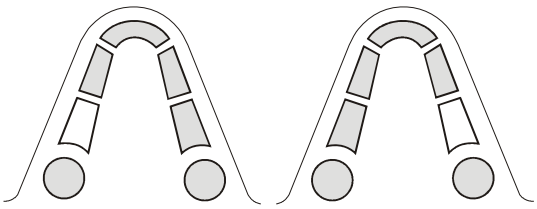
1 Set the imaging program according to a jaw: P13 for mandible and P14 for maxilla.

2 Select the program. Display shows the image layer settings of one area of interest. There are three areas of interest: anterior, premolar and molar.

3 Use left and right buttons to select the area of interest.



Anterior Premolar Premolar



Molar Molar

4 Select “Lon” in time/dose-display for longitudinal image settings. Select the number of the images (0, 1 or 3) in kV display and the longitudinal image layer thickness (5.0 / 6.4 / 8.0 mm) in mA display. If you don’t want images in longitudinal projection, select “ 0 “ images. This feature can be used with follow-up patients.

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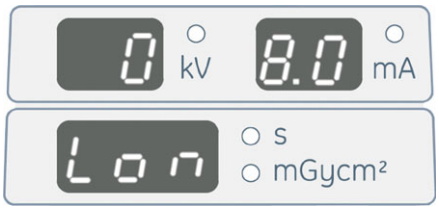
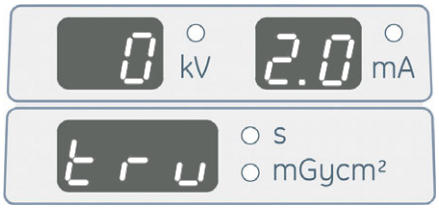


5 Select “trv” in time/dose-display for transversal image settings. Select the number of the images (0, 1 or 3) in kV display and the transversal image layer thickness (2.0 / 2.5 / 3.2 / 4.0 / 5.0 / 6.4 mm) in mA display. If you don’t want images in transversal projection, select “ 0 “ images.



NOTE!

2 mm image layer thickness is only available in one imaging projection. See the following tables for details.

PR 50 LAY: IMAGE LAYER THICKNESSES & NUMBER OF LAYERS				
Image Layer Thickness (mA display)	**Longitudinal Lon (time/dose display)**		**Transversal trv (time/dose display)**	
	Number of layers (kV display)		**Number of layers (kV display)**	
2.0 mm	n/a	n/a	1	3
2.5 mm	n/a	n/a	1	3
3.2 mm	n/a	n/a	1	3
4.0 mm	n/a	n/a	1	3
5.0 mm	1	3	1	3
6.4 mm	1	3	1	3
8.0 mm	1	3	n/a	n/a
0 mm = no images	0		0	

6 Select the number of the images and the image layer thicknesses for other regions of interest. Repeat steps 2 to 4.

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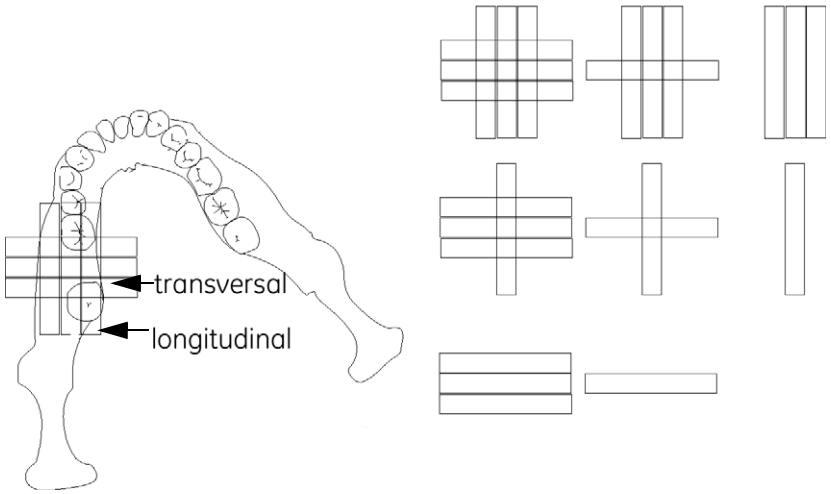

NOTE!

An error message will be generated during exposure, if both longitudinal and transversal image layers are set to " 0 ".

7 Press OK button once to store the changes and exit the user program. " **Pr 50 LAY** " is displayed again. Select another program or exit the user programming mode.

13.2 PR 51 PUS: POWER UP SETTING

The user can set the imaging program and exposure control mode for the control panel to appear after switching the OP200 power on. This will make the use of OP200 even easier and reduce the total imaging time, when the most frequently used imaging program and AEC or Manual mode are automatically selected and the operator can concentrate on patient positioning.

Programming:

1 Select program " **Pr 51 PUS** " and press OK button. Control panel shows current power-up display, e.g.
- Standard panoramic procedure (Program 1) is chosen
- Automatic Exposure Control " **A** " and density setting in the middle are chosen

2 Change the power up setting. Select one of the imaging programs, Program 1 to 14.

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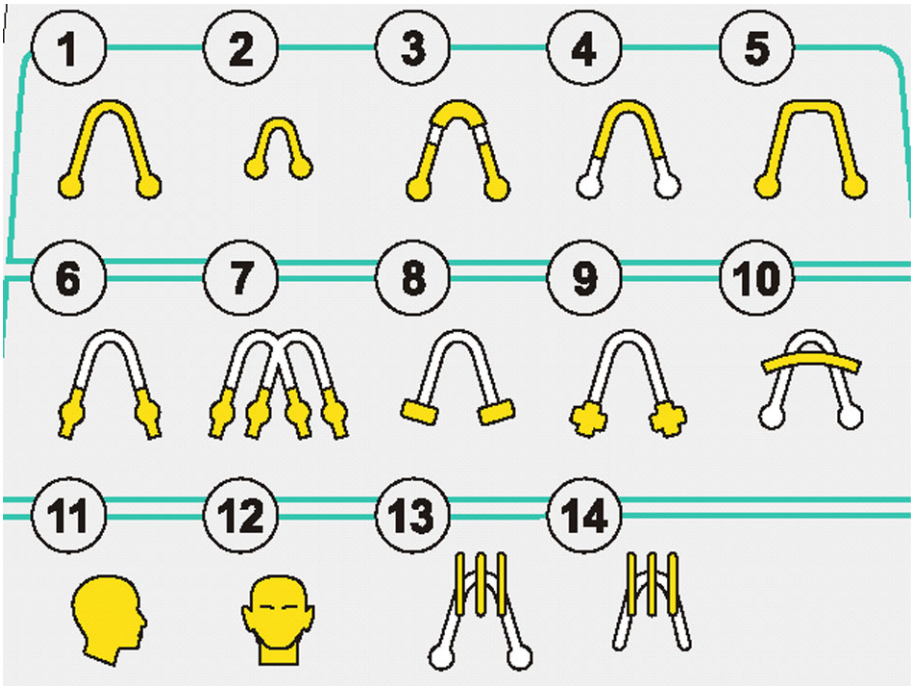

3 Select the exposure control mode: AEC, Manual or Test (A, M or T).

NOTE!

AEC can be selected for the panoramic programs (P1 - P5) and for linear tomography programs P13 and P14.

NOTE!

AEC can be selected only if all the regions of interest (anterior, premolar, molar) are chosen.

4 Press OK button once to store the changes and exit the user program.

13.3 PR 52 GCO AND PR 52 PCO: CONSTANT CONTRAST & DENSITY SETTINGS

OP200 image quality can be controlled by setting the technique factors for film / screen combination and per customer preferences. This is done by giving general contrast and density parameters for all imaging programs with PR 52 GCO and adding an offset value for individual imaging program by PR 52 PCO if necessary. Quality Assurance (QA) film will be used to select optimum image density.

AEC and Manual mode technique factors are related to each other: the selection of contrast (kV level) and density (dose level) will fix the AEC and Manual mode technique factors. Preprogrammed patient

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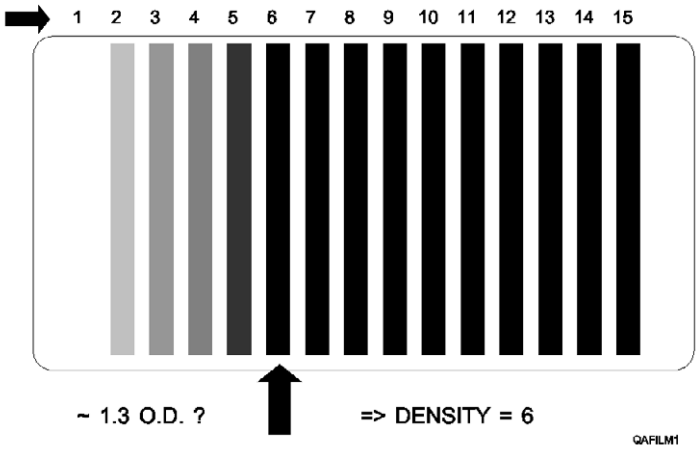
size symbols have only one reference, and this reference is tied to AEC settings. The technique factors' relation between patient size symbols is fixed

PR 52 gCO: General density	
All imaging programs	Density value (default)
	1-15 (5) adjustable by 0,5 steps

Use Quality Assurance film to obtain correct general density setting for gCO. QA film sent from the factory has columns marked with O.D. (Optical Density). QA film column representing about 1.3 - 1.4 O.D. is a reference. Make the QA exposure at site and process the film. Find a column that has the same O.D. or closest with the reference film 1.3 O.D. Calculate the order of this column starting from the lightest column and set this value, e.g. 6, for general density (see figure). There are 15 columns in the QA film.



NOTE!

These technique settings are for guidance. If the patient images are lighter or darker than desired, you may have to change the contrast and / or density according to the user preferences.

Example: If general density is 5 and P1 has contrast " 66 " and offset " 0 " this means that P1 AEC exposure with middle density scale has 66 kV /10 mA starting value. In Manual Control mode preprogrammed patient size symbols have values 66/5, 66/8, 66/10 (as AEC) and 66/ 13.

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NOTE!

Another QA film is needed if these programs use different screen-film combination or cassette.

PR 52 PCO: CONTRAST & DENSITY			
Imaging Program	**Description of Imaging Program**	**Constant Contrast value kV display (default)**	**Density offset value Time display (default 0)**
P1	Panoramic	57 - 85 (66)	0
P2	Panoramic	57 - 85 (66)	0
P3	Panoramic	57 - 85 (66)	0
P4	Panoramic	57 - 85 (66)	0
P5	Panoramic	57 - 85 (66)	0
P6	TMJ	57 - 85 (66)	0
P7	TMJ	57-85 (66)	0
P8	TMJ	57 - 85 (66)	0
P9	TMJ	57 - 85 (66)	0
P10	Sinus Maxillary	57 - 85 (66)	0
P11	Cephalometric	60 - 85 (77)	0
P12	Cephalometric	60 - 85 (77)	0
P13	Ortho Trans mandible	57 - 85 (66)	0
P14	Ortho Trans maxilla	57-85 (66)	0

NOTE!

Grid cassette requires 2 steps higher density setting than the standard cassette.

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NOTE!

Use left and right buttons to choose the regions of interest (anterior, premolar, molar) in the imaging program P13 and P14.

Programming:

1 Select program “**Pr 52 PCO**” and press OK. One of the programs (e.g. P1) is selected. KV display shows the current constant contrast kV level and the time/dose-display shows the density offset from reference for this imaging program.

2 Select the imaging program options by pressing up or down button. When the P1 (or other imaging program) is selected change the program by pressing left or right button.

3 Select or change the constant contrast value for this imaging program by pressing down button. The led of kV display is blinking. Use left or right buttons to change this value.

NOTE!

This kV value will depend on the film-screen combination used. For Kodak Lanex Regular - TMG combination values 66 in P1- P5 and 77 in P11 - P12 and 63 in P13 and P14 are recommended.

4 Select the density level offset if needed for this imaging program by pressing down button. The led of mA display is blinking. Use left or right buttons to change this value. The offset can be from -3 to +3 with half step increments calculated from general density.

NOTE!

These technique settings are for guidance. If the patient images are lighter or darker than desired, you may have to change the contrast and / or density according to the user preferences.

Example: If general density is 5 and P1 has contrast “ 66 “ and offset “ 0 “ this means that P1 AEC exposure with middle density scale has 66 kV /10 mA starting value. In Manual Control mode preprogrammed patient size symbols have values 66/5, 66/8, 66/10 (as AEC) and 66/ 13.

5 If you want to change contrast and density for other programs, repeat steps 2, 3 and 4. Another QA film is needed if these programs use different screen-film combination or cassette.

6 Press OK button to store the changes and exit the user program.

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13.4 PR 53 NOR: RESUME NORMAL SETTINGS

Normal settings for all parameters can be resumed. This can be done after service or in the case of CPU board memory problem. Error counter and exposure counters are not affected.

Programming:

1 Select program **“Pr 53 nor”**. Time display shows **“ OFF “** or **“ on “**. If you by mistake enter this program, select **“ OFF “** to exit without changes. It is recommended to record **“ Pr “** settings prior to using this program.

2 Press left button, if you don’t want to resume normal setting values.
“ OFF “ is displayed.

3 Press right button to resume normal settings. **“ on “** is displayed. This program will affect to the following User programs

Pr 50 LAy:		mandibular	maxilla
	trv ant trv pre trv mol	3.0 3.0 3.0	4.0 4.0 4.0
	lon ant lon pre lon mol	3.0 3.0 3.0	4.0 6.0 6.0
Pr 51 PUS:	P1 blinking, AEC, density in the middle		
Pr 52 gCO:	See default values in the section PR 52 gCO and PCO		
Pr 53 Nor:	OFF or on		
Pr 54 Arn:	on		
Pr 55 HUP:	on		
Pr 56 HLI:	on		
Pr 57 HON:	L -, if positioning lights on the left side r -, if positioning lights on the right side		
Pr 58 CON:	P1-P5 (ASC)		
Pr 59 PSE:	on		
Pr 60 bEP:	on		
Pr 61 CLC:	0		
Pr 62 Err:	CH 05 ooo		

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Pr 66 COU:	us Er 0

These parameters have to be checked for configuring OP200 for daily use.

4 Press OK button to store the changes and exit the user program.

13.5 PR 54 ARN: ROTATING UNIT AUTORETURN

After the exposure the unit can keep moving and then stop so that the patient has an easy exit from the unit. The return movement of the rotating unit after the exposure can be enabled or disabled. Note that the rotating unit can always be returned by pressing the patient positioning button in the patient positioning panel.

NOTE!

At any time if the exposure button is released OP200 stops movements immediately.

Programming:

1 Select program **“ Pr 54 Arn “**. Time display shows **“ OFF “** or **“ on “**.

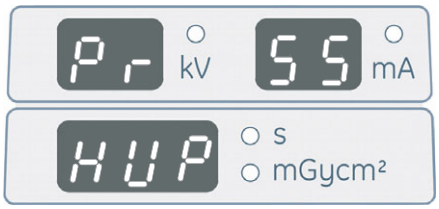
2 Normally rotating unit autoreturn is “on” after the exposure. This enables easy exit for the patient. If “ off “ is displayed, press right button to get “ on “ displayed.

3 Press left button, if you don’t want to rotating unit to return to the nearest patient positioning position after the exposure. **“ OFF “** is displayed. In this case the cassette rack stays behind the patient after the exposure.

4 Press OK button to store the changes and exit the user program.

13.6 PR 55 HUP: CASSETTE HOLDER AUTOLIFT

Cassette holder can be programmed to lift up automatically when the panoramic cassette has been inserted in its place.



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Programming:

1 Select program **“ Pr 55 HUP “.** Time display shows **“ OFF “** or **“ on “**.

2 Press right button, when the automatic lifting up of cassette rack is requested. **“ on “** is displayed.

NOTE!

When the panoramic cassette is inserted, a message **“UP CAS“** *is displayed and the unit aligns itself for patient positioning and raises the cassette holder.*

3 Press left button, when the automatic lifting up of cassette holder is not needed. **“ OFF “** is displayed. In this case the cassette holder can be lifted by pressing the button in the positioning panel.

4 Press OK button to store the changes and exit the user program.

13.7 PR 56 HLI: CASSETTE HOLDER VERTICAL LIMIT

In the rooms with limited ceiling height the cassette holder vertical limit can be activated. This option makes the cassette holder to always stay below the height of the column.

Programming:

1 Select program **“ Pr 56 HLI “**. Time display shows **“ OFF “** or **“ on “**.

2 Press right button, when the cassette holder vertical limit is requested. **“ on “** is displayed.

3 Press left button, when the cassette holder vertical limit is not needed. **“ OFF “** is displayed. Now the cassette holder can raise over the column height.

4 Press OK button to store the changes and exit the user program.

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13.8 PR 57 HON: CASSETTE LIFT SIDE

The home side i.e. the patient positioning side of the unit can be selected. If the unit is supplied with one patient positioning panel, the home side is the same as the panel side. With the Ortho Trans option and two positioning panels the home side is selected with this program.

OP200 operates normally uni-directionally, i.e. the exposure is enabled while the rotating unit moves clockwise (left-handed unit “LL” or “LR”) or counterclockwise (right-handed unit or “RL” or “RR”) and after the exposure the rotating unit returns to starting position.

In OP200 a bi-directional exposure is also possible, where the unit can make an exposure both clockwise and counterclockwise, and no return sequence is necessary after the exposure.

Pr 57 Hon	Positioning Lights	Rotation for exposure	OP/OC200 type
- r -	Right side of unit	Counterclockwise (ccw)	RR, RL
- L -	Left side	Clockwise (cw)	LL, LR
L = r	Dual, on both sides	(cw) -> (ccw) -> (cw) - ->	DL, DR

Programming:

1 Select program **“ Pr 57 Hon “**. Display shows one of the choices: **“ -r- “, “ -L- “ or “ L=r “**.

2 OP200 with Frankfort and layer light on the left side of the unit: The display should have **“ -L-** “. If not, press left or right buttons to select **“ -L- “**.

3 OP200 with lights on the right side: the display should show **“ -r- “**.
If not, select **“ -r- “**.

4 Optionally OP200 models can have dual set of positioning lights used in programs P1-P10. Such models have patient positioning on both sides of the unit and the exposure can start on either side of the unit. In this case, select **“ L=r “**.

5 Press OK button to store the changes and exit the user program.

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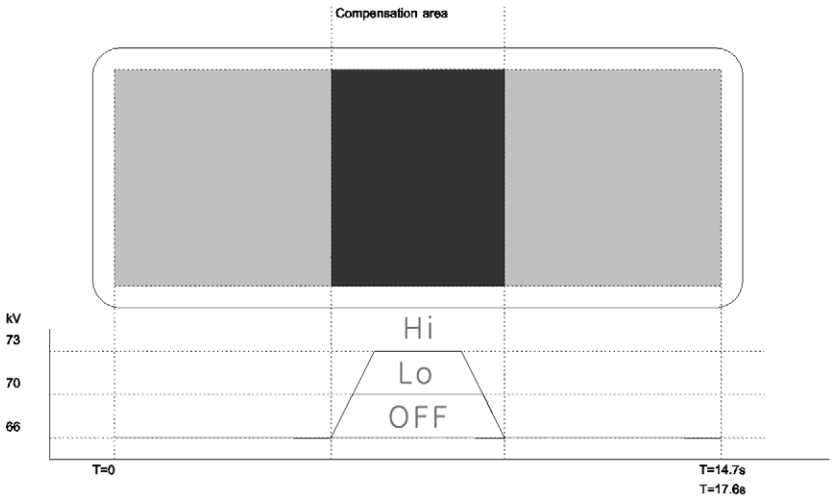
13.9 PR 58 CON: VERTEBRAE SHADOW COMPENSATION

In panoramic programs P1 to P5 the spine column shadow may be compensated. This compensation mode for each panoramic program is set with this program. When this feature is used, kV/mA values are adjusted automatically at spine column to eliminate the shadow of vertebrae. This feature has the same function both in Automatic and Manual exposure control. Most advanced feature is **ASC** for Automatic Spine Compensation where the amount of compensation is automatically controlled. Note that this compensation cannot exceed the maximum x-ray tube voltage of 85 kV.



PR 58 CON: VERTEBRAE SHADOW COMPENSATION				
Panoramic Program	Mode			
P1	OFF	LO	HI	ASC
P2	OFF	LO	HI	ASC
P3	OFF	LO	HI	ASC
P4	OFF	LO	HI	ASC
P5	OFF	LO	HI	ASC

Programming:

1 Select program **“ Pr 58 Con “**. One of the panoramic program indicators P1 to P5 is lit and the time display shows the current compensation mode for this program: **ASC**, **HI**, **LO** or **OFF**.

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2 Press right or left button to change the compensation mode for this imaging program:

“OFF” disables this feature. It can be selected with pediatric patients. When disabled, the same kV value is used during the exposure cycle.

“LO” compensates the spine shadow by one mA-step (Lo = 1). It is selected with most of the patients.

“HI” compensates the spine shadow by two mA-steps (Hi = 2). It can be selected with large patients.

Select **“ASC“** for Automatic Spine Compensation (0 < ASC < 2). MA compensation will be determined automatically.

Sequence of the mA values:

2.0 - 2.5 - 3.2 - 4.0 - 5.0 - 6.4 - 8.0 - 10.0 - 13.0 - 16.0.

NOTE!

Value 13.0 mA showed on the mA display is precisely 12.5 mA.

Example of use 1: Onset is 66 kV / 8 mA. a) With Lo (one step) selection the new value shall be 66 kV / 10 mA. b) With Hi (two step) selection the new value shall be 66 kV / 13 mA.

Example of use 2: Onset is 60 kV / 13 mA. a) With Lo (one step) selection the new value shall be 60 kV / 16.0 mA. b) With Hi (two step) selection the new value shall be 63 kV / 16.0 mA, as the sequence of the mA values doesn’t get any further than 16.0 mA.

3 Change the compensation mode for other panoramic programs. Press up button to select another imaging program. Press down button to select the compensation mode. Press right or left button to change the compensation mode (Hi, Lo, Asc or Off) for this imaging program.

4 Press OK button once to store the changes and exit the user program.

5 Change the compensation mode for other panoramic programs. Press up button and select another panoramic program. Press down button and repeat step 2.

6 Press OK button once to store the changes and exit the user program.

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13.10 PR 59 PSE: PREVENTATIVE MAINTENANCE REMINDER

OP200 has a feature to inform the user every 2000 exposures about preventative service. When activated, a Preventative Maintenance Request message “Ch 8 PSE“ is displayed automatically after power up -sequence, when cumulative 2000 exposures have been taken and it come again until it is cleared with this program. This message has no affect to the unit’s operation.

Programming:

1 Select program **“Pr 59 PSE“**. Time display shows **“ OFF “** or **“ on “**.

2 Press right button to enable this reminder feature. **“ on “** is displayed.

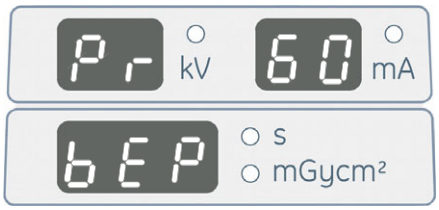
3 If you don’t want to use this reminder feature, set “ off “ to be displayed by pressing left button.

4 Press right button to reset this counter or to clear the **“ Ch 8 PSE “** service message. **“ rES “** is displayed. Next **“ Ch 8 PSE “** service message will come after 2000 exposures.

5 Press OK button to store the changes and exit the user program.

13.11 PR 60 BEP: PANEL BEEP

Enables the response “beep” when pushing any button in the OP200 panels. This feature can be disabled, if needed for maintenance and testing.



Programming:

1 Select program **“ Pr 60 bEP “**. Time display shows **“ OFF “** or **“ on “**.

2 Press left button, if you don’t want to hear the beep-signal after pushing the panel buttons. **“ OFF “** is displayed.

3 Press right button, if you want to enable the beep-signal after pushing the panel buttons. **“ on “** is displayed.

4 Press OK button to store the changes and exit the user program.

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13.12 PR 61 CLC: CLEAR EXPOSURE COUNTER

The left and right buttons toggle between zero and the current clearable exposure count (user counter, “trip meter”). The exposure count is the same as displayed when entering the user programming mode. Toggling to ”0” and pressing ”OK” will clear the exposure count.

Programming:

1 Select program **“ Pr 61 CLC “**. MA and time displays show the total number of exposures since last clearing of this counter.

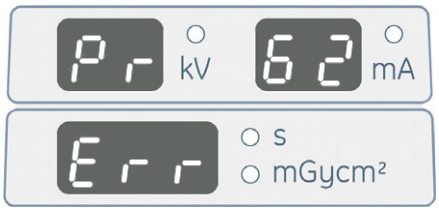
2 Press left button to clear the counter value to zero after Installation or Maintenance. **“ 0 “** is displayed.

3 Press right button, if you don’t want to clear the exposure counter value to zero. Number of exposures taken is displayed on the time/dose time display.

4 Press OK button once to store the changes and exit the user program.

13.13 PR 62 ERR: LAST FAILURE CODE

OP200 stores in the memory the last storable failure code information. A new OP200 may have a failure code already in this memory and this is considered normal.



Programming:

1 Select program **“ Pr 62 Err “**. OP200 displays the last failure code. If there are no failure codes stored in the memory, displays show **“ Ch 00 - - - “**.

2 Press OK button once to store the changes and exit the user program.

NOTE!

Ch failure codes will not be stored, except **“ Ch 5 ooo “**. *Sy failure codes will be stored, except* **“ Sy 20 ooo “** *and* **“ Sy 26 EEP“**.

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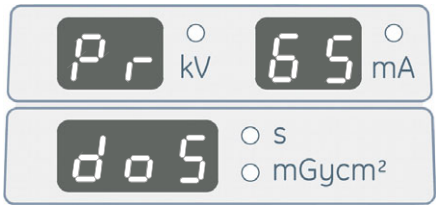
13.14 Pr 65 doS: DOSE / TIME DISPLAY SELECTION

The time/dose display factor during exposure can be selected. If both exposure time and estimated dose needs to be seen, a selection with **con** (=confirmation) has to be selected.



Programming: :

1 Select program **“ Pr 65 doS “**. OP200 displays the **“ SE cS con “**, **“ dA P con ”**, **“ SE cS ”** or **“ dA P ”**. Con means confirm and requires the user to press up and down buttons to flip between seconds and dap, and to press OK button to sign for the values after the exposure.

2 Use right and left buttons to select **“ SE cS con “**. Seconds used to the exposure shall be shown in the time/dose display during and after the exposure. Use up and down buttons to flip the time and dose values.

3 Use right and left buttons to select **“ dA P con ”**. Dose used to the exposure shall be shown in the time/dose display during and after the exposure. Use up and down buttons to flip the time and dose values.

4 Use right and left buttons to select **“ SE cS ”**. Seconds used to the exposure shall be shown in the time/dose display during and after the exposure, but dose can not be seen.

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5 Use right and left buttons to select **“ dA P ”**. Dose used to the exposure shall be shown in the time/dose display during and after the exposure, but time can not be seen.

NOTE!

SEcS/dAP Con: The user looses the exposure time and dose value when pressing the OK button after exposure.

NOTE!

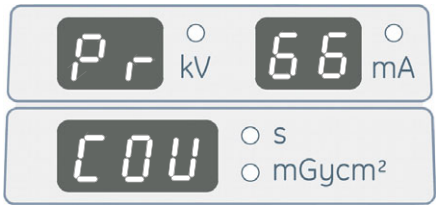
SEcS/dAP: The user looses the exposure time or dose value when pressing any button after exposure.

NOTE!

SEcS/dAP and Failure code(s): Time or dose value is displayed after the user has signed all the failure codes.

13.15Pr 66 COU: Exposure counters

OP200 has various exposure counters. This program is used for checking counter values.



1 Select program **Pr 66 COU**. OP200 displays an user counter.

2 Press down button to see the next counter.

3 Press OK button once to store the changes and exit the user programprogramming mode.

Counter	Description
uSEr	Resettable trip counter.
totAL	Total exposure counter. Not resettable.
tubE	Tube exposure counter. Not resettable.

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Counter	Description
SErvicE	Exposure count since last preventative maintenance reminder was resetted by Pr 59 PSE.
LEASE	This counter is used only if the Sr 71 PAY lease period has been activated.
InStALL	This counter shows the number of exposures taken in the service mode only. When exposures are made in service mode, this doesn't effect on user, service and lease counters.

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14User's statement

Instructions for the use of the Orthopantomograph® OP200 and precautionary statements are part of the OP200 User Manual.

Radiation leakage technique factors

The maximum-rated peak tube potential is 85 kV with the maximum rated continuous tube current of 1.5 mA. 1.5 mA is the equivalent maximum rated continuous tube current for 13 mA with a duty cycle of 1:7. Duty cycle is automatically calculated by the software so that the next exposure does not exceed the anode thermal capacity. The equation used by the software is

mA*s*kV = Initial heat capacity [J] + Anode cooling rate [J/s] * 3600 [s]

where:

mA*s*kV = Maximum energy input during one hour

Initial heat capacity = 28000 Joules [J] for tube type D-051S

Anode cooling rate = 120 Joules/s [J/s] for tube type D-051S

3600 = 1 hour observation time [s]

Beam limiting device / tube housing assembly compatibility

The tube housing assembly THA 100 is compatible with the beam limiting device BDP138 or BDC184.

Equipment statement for tube housing assembly

Maximum operating voltage is 85 kV. Effective focal spot 0.5 (IEC 336/ 1982).

X-ray tube: Toshiba D-051S. For additional information please refer to the tube specification sheets.

Maximum deviation from indicated values

Parameter	Indicated value	Deviation
Tube voltage	57 - 85 kV	± 5 kV
Tube current	2 - 16 mA	± 1 mA or 10%, whichever is larger
Exposure time (pan)	16.8 - 17.6 s	± 0.1 s or 10%, whichever is larger
Exposure time (TMJ, Sinus)	8 - 15.6 s	± 0.1 s or 10%, whichever is larger
Exposure time (cephalometric)	0.1 - 3.2 s	
Exposure time (linear tomography)	1.6 - 28.8 s	

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Power supply requirements

Rated nominal voltage 110/230 VAC, 50/60 Hz single phase.

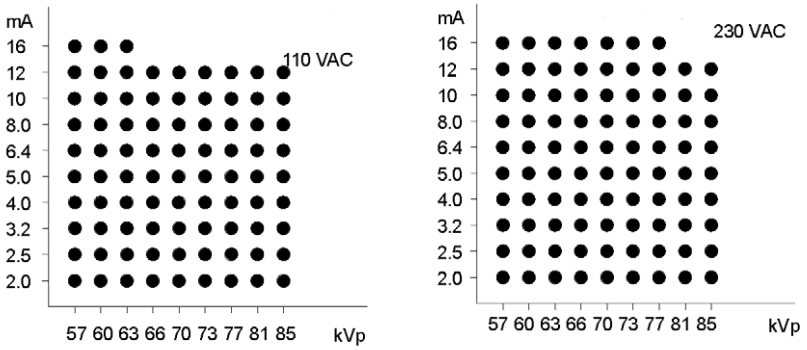
Maximum line current

With 110 VAC power supply systems maximum line current during the exposure is 15 A, at stand-by maximum 1A. The system line fuses are Bussman MDA-15 A slow blow type.

With 230 VAC power supply systems the maximum line current during the exposure is 10 A, at stand by maximum 1 A. The system line fuses are Litfelfuse 326 10 A slow blow type.

General output rating and duty cycle

The following charts represent technique factors that can be used with the selected line voltage. One of the three technique factors is always fixed. Panoramic and Special procedures use fixed exposure time, while Cephalometric prosedures used fixed tube current value.



TECHNIQUE FACTORS FOR CEPHALOMETRIC PROCEDURES	
kV	60, 63, 66, 70, 73, 77, 81, 85
mA	13 mA
s	0.1, 0.12, 0.16, 0.2, 0.25, 0.32, 0.4, 0.5, 0.64, 0.8, 1.0, 1.2, 1.6, 2.0, 2.5, 3.2

Exposures are automatically limited during duty cycle cooling times, minimum of 15 s.

Maintenance

To keep the equipment in compliance with the DHHS Performance Standard the following maintenance schedule shall be observed:

Up to 40 exposures per week, perform maintenance every 12 months. At 40 - 100 exposures per week, perform maintenance every 6 months. Refer to the chapter *Maintenance* of this manual for details.

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Tube ratings

Maximum rating chart

Multi-Peak Full Wave rectified

(HF Inverter System)

Focal spot: 0.5 mm (IEC 336/1982)

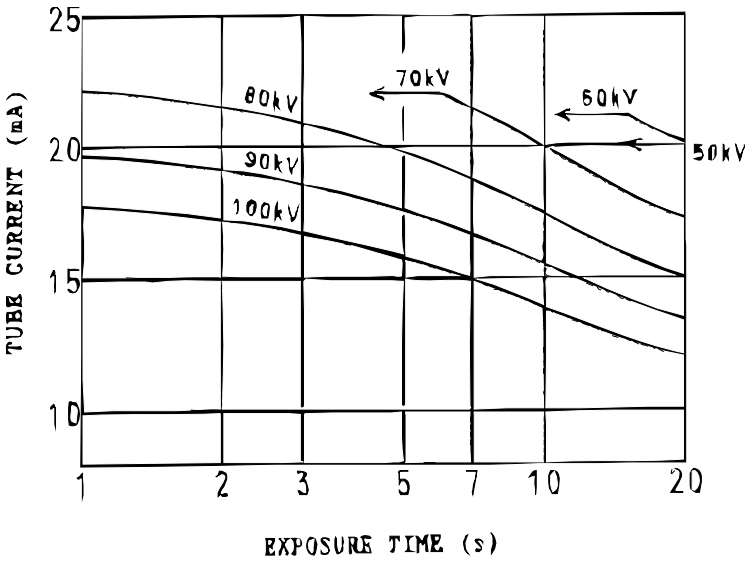

Fig 14.1. Tube ratings

Tube anode thermal characteristics (D-051s)

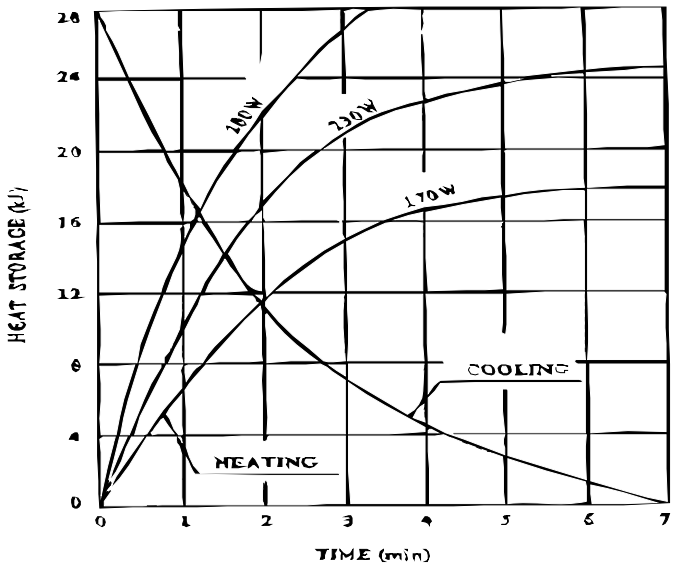

Fig 14.2. Tube anode thermal characteristics (D-051S)

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Tube head assembly cooling curve

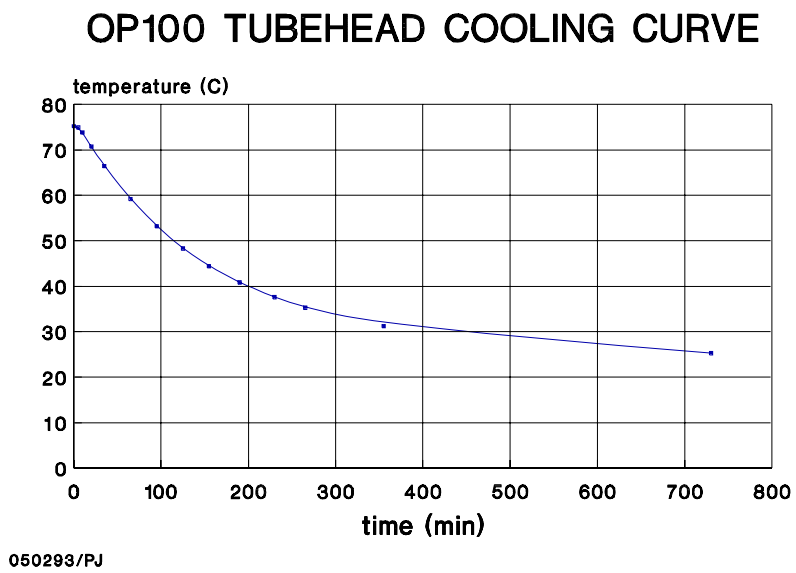

Fig 14.3. Tube head assembly cooling curve

We reserve the rights for technical changes at any time.

OP200/ OC200 Patient Dose

kV	mA	Patient doses, µSv in standard Panoramic program number 1
57	2	1,9
63	5	5,7
63	10	10,9
63	13	12,8
66	5	7,2
66	13	16,8
66	16	21,0
70	5	8,6
70	13	20,4
70	16	26,5
73	8	15,5
73	13	23,8
73	16	31,7
77	5	12,1
77	8	18,7
77	13	27,1

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kV	mA	Patient doses, µSv in standard Panoramic program number 1
77	16	35,4
81	8	21,1
81	13	31,3
85	13	36,0

kV	mA	Time s	Patient doses, µSv with cephalostat program in lateral positioning (18x24cm)
*60	13	0,16	0,4
77	13	0,4	3,6
77	13	0,5	4,5
77	13	0,64	5,7
77	13	0,8	7,2
77	13	1,2	10,7

* Carpus imaging.

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15 Technical specifications

Manufacturer:	Instrumentarium Dental, P.O. Box 20, FIN-04301 Tuusula, FINLAND
Quality system:	In accordance with ISO 9001 standard
Environmental management system:	In accordance with ISO 14001 standard
Electrical & mechanical safety:	According to IEC 601-1, UL and C-UL (File E301913) CE models marked according to the Medical Device Directive 93/42/EEC

Product name:	ORTHOPANTOMOGRAPH® ORTHOCEPH®
Model:	Orthopantomograph® OP200 Orthoceph® OC200 Orthopantomograph® OP200 OT Orthoceph® OC200 OT Orthopantomograph® OP200 CR Orthoceph® OC200 CR Orthopantomograph® OP200 OT/CR Orthoceph® OC200 OT/CR
Product type:	Film Panoramic X-ray Unit Film Panoramic X-ray Unit with Cephalostat

Unit data	
Class	I
Type	B
Protection	IP-20
Operation	Continuous operation with intermittent loading
Power supply	Mains plug connection
High voltage	DC
First software version	Release 1.2 dated 17.3.2005 by Instrumentarium Dental

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Standards this unit complies with	IEC 60601-1 UL 60601-1 MDD (93/42/EEC) (if the unit contains CE mark) UL/CSA (file E301913, if the unit contains UL/CSA mark)

Tube head assembly	
Tube head assembly type	THA 100
Tube type	Toshiba D-051S, Stationary anode
Tube voltage	57-85 kV
Max. tube current	2-16 mA
Max. electric output	1,36 kW
Target angle	5 degrees
Focal spot	0,5 mm (IEC 336/1982)
Nominal anode input power	1750 W
Max. anode heat content	28 kJ
Max. X-ray tube assembly heat content	385 kJ
Max. continuous heat dissipation of the X-ray tube assembly	38W
Total filtration	2,5 mm Al
Additional filtration for Linear Tomography	12 mmAl
Leakage Technique Factors	85 kV / 1.5 mA

Electrical connections	
Nominal mains voltage	110/230 VAC Automatic mains voltage compensation
Input power frequency	50 / 60 Hz
Nominal current	10A @ 230 VAC, 15A @ 110 VAC
Fuses	326 Littelfuse (slow blow) 10A @ 230 VAC, MDA-15 COOPER BUSSMAN (Time delay) 15A @ 110 VAC

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Electrical connections	
Power consumption	2.3 kVA @ 230 VAC, 1.65 kVA @ 110 VAC
Maximum impedance of main	1,0 Ω

X-ray Generator:	
Nominal power	1.2 kW
Tube voltage	57 - 85 kV
Tube current	2-16 mA
Supply frequency	75 - 150 kHz
Spine compensation	0 to 2 mA steps increase, max. 16 mA
Spine compensation mode	Automatic (ASC), Pre-programmed

Digital Imaging Options:	
CR model or CR kit Allows the use of (24 x 30 cm) cassette size in Pan cassette holder. (Especially if (24 x 30 cm) PSP plates are used)	OP200 CR, OC200 CR, OP200 OT/CR and OC200 OT/CR models for Panoramic, TMJ, Maxillary Sinus, Cephalometric and Linear Tomography Imaging
CCD Technique	OP200 upgrade kit or OC200 upgrade kit.

Procedures:	
Imaging programs:	5 Panoramic, 4 TMJ, Maxillary Sinus, 2 Linear Tomography and Cephalometric
Exposure Control:	Automatic, Pre-programmed, Manual and Quality Assurance

Panoramic and special imaging programs, exposure time, nominal magnification:		
Standard (Program 1)	17.6 s	30%
Pediatric (P2)	16.8 s	30%
Ortho Zone (P3)	16.8 s	25%

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Panoramic and special imaging programs, exposure time, nominal magnification:		
Orthogonal (P4)	16.8 s	30%
Wide arch panoramic exposure (P5)	17.4 s	30%
TMJ, lateral (P6) or Ortho TMJ, axial corrected lateral projection (P6 optional)	10.8 s 10.8 s	23%
TMJ jaw closed & open (P7)	15.6 s	23%
TMJ PA (P8)	8.0 s	80%
TMJ lateral & PA (P9)	12.2 s	23 & 80%
Maxillary sinus (P 10)	15.6 s	30%

Technique Factors, Cephalostat Procedures:	
Tube voltage/Tube current /Exposure time (P11-P12)	60 - 85 kV, 8 values / 13 mA / 0.1 s - 3.2 s, 16 values
Magnification:	14% nominal in cephalometric procedures (adjustable 8-14%)
Exposure Time Limit:	22 s

Technique Factors, Linear Tomography Procedures:	
Mandible (P13) & Maxillary (P14)	57 - 85 kV / 2 -16 mA / 1.6 - 28.8 s
Magnification:	40%

Linear Tomography Image Layers:	
Choice of longitudinal images	3, 1 or none
Choice of transversal images	3, 1 or none

Positioning Lights:	
Panoramic, TMJ & Maxillary Sinus Programs	laser (CLASS 1 LASER PRODUCT)

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Positioning Lights:	
Linear Tomography Programs	laser (CLASS 1 LASER PRODUCT)

Panoramic Film Cassette:	
Film size	15 x 30 cm
Cassette type and screens	Flat cassette. Window for Ortho ID film marking. Kodak Ektavision intensifying screens, Kodak Lanex Regular or Kodak Lanex Medium.

Cephalostat Film Cassette(S):	
Film sizes	18 x 24 cm and 24 x 30 cm 8" x 10", 10" x 12"
Cassette types and screens	Flat cassette(s). Window for Ortho ID film marking. Kodak Ektavision intensifying screens, Kodak Lanex Regular or Kodak Lanex Medium. Cassettes are optional on some market areas.

Optional Grid Cassette For Linear Tomography Procedures:	
Film size	15 x 30 cm
Cassette type and screens	Flat cassette. Window for Ortho ID film marking. Grid ratio 6:1. Parallel focus. 57 lines / cm. Integrated or external grid. Kodak Ektavision intensifying screens, Kodak Lanex Regular or Kodak Lanex Medium.

Interfaces:	
Exposure button	Auxiliary button with 10 m cable for remote use (optional in USA/Canada)
Film marking	Serial interface for Ortho ID

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Panoramic patient positioning:	
Operation	Left or right side of the unit Motorized carriage movement
Positioning aids	Chin rest, bite block, 3-point headrest, curved mirror, laser (CLASS I PRODUCT) positioning lights, occlusion correction buttons
Cassette movement	Cassette rack up/down movement

Cephalostat patient positioning:	
Operation	Arm mounts on left or right side of the unit. Interlocked flat cassette. Motorized carriage movements with buttons at cephalostat assembly. Locked position for ear holders.
Positioning aids	Ear holders, nasion support with mm scale Manual setting of soft tissue filtering.

OP200 physical measures:	
source-image distance (SID)	19.2 inches / 487 mm (Panoramic)
Installation	Standard wall mount with ±45° angled joint, Optional base for free standing unit
Height x Width x Depth (inches/mm)	87.3 x 32.7 x 39.4 inches -Max. 2272 x 830 x 1000 (standard column) - 84.0 x 32.7 x 39.4 inches -Max. 2182 x 830 x 1000 (short column option) 84.0 x 32.7 x 39.4 inches -Max. 2472 x 830 x 1000 (long column option)
Weight	175 kg / 385 lbs. (Panoramic)

OC200 physical measures:	
source-image distance (SID)	68.7 inches / 1745 mm
source-object distance (SOD)	60 inches / 1524 mm

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OC200 physical measures:	
Installation	Standard wall mount with 45° angled joint,Optional base for free standing unit
Height x Width x Depth (inches/mm)	87.6 x 74.8 x 39.4 inches-Max. 2272 x 1900 x 1000 (standard column)- 84.0 x 74.8 x 39.4 inches-Max. 2182 x 1900 x 1000 (short column option) 84.0 x 32.7 x 39.4 inches -Max. 2472 x 830 x 1000 (long column option)
Weight	210 kg / 465 lbs. (Cephalometric)

15.1 ELECTROMAGNETIC COMPATIBILITY (EMC) TABLES

Orthopantomograph® OP200 is suitable for use in the specified electromagnetic environment. The purchaser or user of Orthopantomograph® OP200 should assure that it is used in an electromagnetic environment as described below:

Emissions Test	Compliance	Electromagnetic Environment
Radio-Frequency Emissions CISPR11	Group 1	Orthopantomograph® OP200 uses RF energy only for its internal function. Therefore, the RF emission is very low and not likely to cause any interference in nearby electronic equipment.
Radio-Frequency Emissions CISPR11	Class B	Orthopantomograph® OP200 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	IEC 61000-3-2 Class A	Orthopantomograph® OP200 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	Orthopantomograph® OP200 is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

Table 15.1 Electromagnetic emissions IEC 60601-1-2 Ed2

Orthopantomograph® OP200 is suitable for use in the specified electromagnetic environment. The purchaser or user of Orthopantomograph® OP200 should assure that it is used in an electromagnetic environment as described below:			
Immunity Test	**IEC 60601-1-2 Test Level**	**Compliance Level**	**Electromagnetic Environment**
Electrostatic discharge (ESD) IEC 61000-4-2	± 2, 4, 6 kV for contact discharge ± 2, 4, 8 kV for air discharge	± 2, 4, 6 kV for contact discharge ± 2, 4, 8 kV for air discharge	Floors are wood, concrete, or ceramic tile, or floors are covered with synthetic material and the relative humidity is at least 30 percent.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality is that of a typical commercial and/or hospital environment
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality is that of a typical commercial and/or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % U_T (> 95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles < 5 % U_T (> 95 % dip in U_T)	< 5 % U_T (> 95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles < 5 % U_T (> 95 % dip in U_T)	Mains power quality is that of a typical commercial and/or hospital environment. If the user of Orthopantomograph® OP200 requires continued operation during power mains interruptions, it is recommended that Orthopantomograph® OP200 be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields are at levels characteristic of a typical location in a typical commercial and/or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

Table 15.2 Electromagnetic immunity IEC 60601-1-2 Ed2

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Orthopantomograph® OP200 is suitable for use in the specified electromagnetic environment. The purchaser or user of Orthopantomograph® OP200 should assure that it is used in an electromagnetic environment as described below:

Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment
			Portable and mobile RF communications equipment are used no closer to any part of Orthopantomograph® OP200, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter.
Conducted RF IEC 61000-4-6	3 V150 kHz to80 MHz	[V_1] 3 V	**Recommended Separation Distance:** $d = [\frac{3,5}{V_1}]\sqrt{P}$
Radiated RFIEC 61000-4-3	3 V/m80 MHz to2,5 GHz	[E_1] 3 V/m	$d = [\frac{3,5}{E_1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E_1}]\sqrt{P}$ 800 MHz to 2,5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,* are less than the compliance level in each frequency range.** Interference may occur in the vicinity of equipment marked with the following symbol:

*Field strengths from fixed transmitters, such as base stations for cellular telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast cannot be estimated accurately. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be performed. If the measured field strength exceeds the RF compliance level above, observe Orthopantomograph® OP200 to verify normal operation in each use location. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating Orthopantomograph® OP200.

**Over the frequency range 150 kHz to 80 MHz, field strengths are less than [V_1] V/m.

The Recommended Separation Distances are listed in the next table.

Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Table 15.3 RF immunity of non-life-support equipment or system IEC 60601-1-2

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16 Maintenance

This unit is designed to provide reliable performance and many years of customer satisfaction. In order to assure safe performance of this X-ray equipment, a preventative maintenance program must be established. It is the owner's responsibility to supply or arrange for this service. Consult your Orthopantomograph® dealer to arrange for this service.

16.1 Maintenance Schedule

Maintenance service for Orthopantomograph® OP200 is suggested at installation and after each 2000 exposures. This periodic maintenance is outlined in OP200 *Service Manual Maintenance*.

These maintenance procedures require the services of a qualified technician. In addition to periodic maintenance any deviation from normal performance should be immediately reported to your dealer.

WARNING!

Only trained and qualified personnel should be permitted access to the internal parts of the equipment.

16.2 Monthly Inspection by User

The user must perform monthly the following inspections:

- Visually check that all visible labels are intact and legible
- Visually check that the exposure indicator light is lit for the duration of exposure
- Confirm that the audible indicator sounds for the duration of the exposure
- Check that exposure button must be kept pressed continuously during the exposure cycle
- Check that exposure terminates and an error code is displayed when prematurely releasing the exposure button
- Check all the functions of the control panel and the positioning panel

16.3 Preventative Maintenance Reminder

The equipment has a special feature that displays a message "Ch 8 PSE" on time display after every 2000 exposures. See *User program chapter in OP200 User Manual* for details.

NOTE!

Wiring diagrams, schematics and other documents, which are needed when the unit is repaired, will be supplied by request to authorized service personnel.

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